HARMONICON COELESTE:

OR,

The Cœlestiall Harmony of the

VISIBLE WORLD:

CONTEINING,

An absolute and entire Piece of

ASTRONOMIE.

WHEREIN

Is succinctly handled the *Trigonometricall* Part, generally Propounded, and particularly Applyed in all Questions tending to the *DIURNALL MOTION*.

Especially respecting, and truly subservient to the main Doctrine of the Second Motions of the *Luminaries* and the other *Planets*: Together with their Affections as ECLIPSES, &c.

Grounded upon the most *Rationall Hypothesis* yet Constituted, and compared with the best Observations that are Extant, especially those of TYCHO BRAHE, and other more Modern *OBSERVATORS*.

Fitted to the *Meridian* of the most Famous and Ancient *Metropolis* LONDON, and principally intended for our English Nation, and commended as usefull to all *Schclers*, *Astronomers*, *Astrologers*, *Divines*, *Physitians*, *Historiographers*, *Polititians*, and *Poets*, &c.

By VINCENT WING. *Philomathemat.*

Quum respicio Cœlos tuos, opus digitorum tuorum; Lunam & Stellas quas statuisti: quid est mortalis, quòd memor sis ejus? aut filius hominis, quòd visites eum? Psal 8.4,5.

LONDON:

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Wing; Vincent

John Fuller his booke 1673.

IF.

TO THE RIGHT

HONOURABLE

BAPTIST,

LORD NOELL,

VISCOUNT

CAMPDEN.

RIGHT HONOURABLE,

I Dare not (as those unnaturall Heathens deal with their Infants, who as soon as they are come into this World, their passage into another World by an unwarranted Baptism) commit these Productions of my Idea to the wide Ocean of fluctuating Opinions, without the assistance of some faithfull Pilot, and the protection of some Honourable Personage as your Self; without the which it might happily appear misshapen and monstrous to the eye of the World, and un-easily escape Submersion, if most mens judgements act the part of blinde Fortune, which (as Salust tels us) *Res cunctas ex libidine magis quam ex vero celebrat, obscuratq;* especially if that be true, which the learned Verulam saith, *Tempus simile est Flumini, qui levia atq; inflata devehit, solida autem &*

TO THE RIGHT HONOURABLE BAPTIST, LORD NOELL, *VISCOUNT* CAMPDEN,

RIGHT HONOURABLE:

I Dare not (as those un-naturall Heathens deal with their Infants, who as soon as they are come into this *Venter*, their passage into another *World* by an unwarranted *Baptism*) commit these *Productions* of my *Pen* to the wide *Ocean* of fluctuating *Opinions*, without the assurance of some faithfull *Pilot*, and the protection of some *Honourable Personage* as your *Self*; without the which it might happily appear *mis-shapen* and *monstrous* to the *eye* of the *World*, and un-easily escape *Submersion*: if most mens judgements act the part of blinde *Fortune*, which (as *Salust* tels us) *Res cunctas ex lubidine magis quam ex vero celebrat, obscuratq;* especially if that be true, which the learned *Verulam* saith; *Tempus simile est Fluvio, qui levia atq; inflata devolvit, solida autem &*

 pondus

Wing, Vincent

John Fuller his book 1673

IF

To The Right HONOURABLE BAPTIST, LORD NOELL, *VISCOUNT* CAMPDEN,

RIGHT HONOURABLE:

I Dare not (as thoſe un-naturall Heathens deal with their Infants, who as ſoon as they are come into this *Venter*, their paſſage into another *World* by an unwarranted *Baptiſm*) commit theſe *Productions* of my *Pen* to the wide *Ocean* of fluctuating *Opinions*, without the aſſurance of ſome faithfull *Pilot*, and the protection of ſome *Honourable Perſonage* as your *Self*; without the which it might happily appear *miſ-ſhapen* and *monſtrous* to the *eye* of the *World*, and un-eaſily eſcape *Submerſion*: if moſt mens judgements act the part of blinde *Fortune*, which (as *Saluſt* tels us) *Res cunctas ex lubidine magis quam ex vero celebrat, obſcuratq;* eſpecially if that be true, which th e learned *Verulam* ſaith; *Tempus ſimile eſt Fluvio, qui levia atq; inflata devolvit, ſolida autem &*

pondus habentia ſubmergit, I muſt neceſſarily embrace *Virgils* counſell,

Principio ſedes apibus ſtatioq; petenda
Quo neq; ſit ventis aditus———

Since that as the *Yeare* conſiſting of more *foul* then *fair* days, ſo the *World* in truth accounts more bitter blaſts and virulent cenſures of *Detraction* then *candid, ſerene*, and *unprejudiced* judgements; I muſt repair to your *Honour, Lumen, collumenq; meum*, as to *Seths* Pillars, which in deſpight of whole *Torrents* of Oppoſers and *Catarracts* of *Zoilus* his furious Off-ſpring, will *media inter prælia*, ſecure theſe my poor Labours and perpetuate them, as indeleble as the *Stars*, or your *Lordſhips Honour*, and may ſing with *Homer*, 12 *Odyſ.*

———ἔπειγε γὰρ οὖρος ἀπήμων.
Αὐτίκ' ἔπειτ' ἄνεμος μὲν ἐπαύσατο ἠδὲ γαλήνη.
Ἔπλετο νηνεμίη,

Urgebat enim ventus innoxius, ſtatim deinceps ventus quievit, atq; tranquillitas erat cum venti ſilentio. What other enforcements emboldned me to preſent theſe my pains, the Poet ſhall anſwer for me:

———*Natale ſolum dulcedine cunctos*
Ducit; & immemores non ſinit eſſe ſui.

It may not detract from Your *Honour* to *Chriſten* a poore *Neighbours Childe*, which may not unlikely be the *Father* of much *advantage* to the *Publique* The *Penny* is ſtampt with the *Kings Impreſſe*, as well as the faireſt *Jacobus*. If You will be pleaſed to *own* the *Dedication*, You will doubtleſſe, by the *Honourable Patronage*, evince the *currencie* of the *matter*, that it is *genuine* and *in-adulterate*, and in the eſtimation of the moſt *knowing Men*, to be *aerei mellis Cœleſtia dona.*

Your Lordſhips moſt humble and
faithfull Servant,

Vincent Wing.

TO THE JUDICIOUS READER:

'ΑΛΗΘΕΝΕΙΝ.

GOD Almighty, whom the ancient Philosopher *Trismigist*, did wittily describe to be [*intelligibilis Sphæra, cujus centrum ubique, circumferentia nullibi*] as he is the first beginning, so is he the ultimate end of all created beings, amongst which, by an harmonious subordination of ends, some are disposed more immediately, others more remotely, to the Glory of his eternall Essence, above all the rationall being, man may challeng the superiority, though much impaired in his faculties by the primitive laps, that he can naturally see this supream, infinite being in the Glasse of the Creatures, which do reflect to Him that Infinitely Divine Wisdom, which he cannot perceive directly, but (as *Moses*) his back parts onely, *& ex posteriori*. A principall view hereof, the Stars, those heavenly Bodies, will easily exhibit, that by discourse, contemplation, and evident demonstration of their indefinite magnitude and multitude, transcendent beauty and lustre, and their admirable order, can forcibly reason us to conclude: τὰ ἀόρατα τοῦ Θεοῦ, a most Immense, Infinite, Beautifull and Wise God. For as he argues well of a curious *Architas*, from his admirable artifice; of a wise *Pater-familias* from the sweet decorum of his family, of a potent Lord from the great extent of his possessions, stately buildings, &c. so by a more just analogie *cæteris Paribus*, upon the meditation of an immense extended Space, and herein a more stately Fabrick the World, consisting of innumerable Variety, constant and stupendious Order, of vast conspicious Bodies, I say, such an Oeconomy deeply considered, cannot but suffix a *Quod erat demonstrandum*, to the Omnipotency and transcendent Glory of the Creatour. Hence it is, that *Philo* the Jew, in his book *de Mundi opificio*, saith, that man was placed here by his Maker, as upon a Theatre, to look upon those uniforme and various Spectacles; hence *Plato* saith, we have our Eyes, and *Ovid*: *Os homini sublime dedit cœlumque tueri*. That through those Casements, the Cœlestiall Species may be transmitted to the understanding, to raise high meditations of our God. Truly, worthy, therefore of your entertainment is this Science, *viz. Astronomy*, which leads you by the hand,

hand, as it were, to ſo an ineſtimable treaſure, and (as the learned *Dee* once ſaid) lifteth the heart above the Heavens by inviſible Lines, and immortall Beams, meeteth with the reflexions of light incomprehenſible, and ſo procureth joy and perfection unſpeakable. *Fœlices animæ quibus hac cognoſcere primum*, ſings the Poet. But leſt I ſhould ſoar too high in this too curious ſearch, I will levell my pen in the brief inquiry of the ſpeciall uſes and apparent influences this art chalengeth in humane affairs. How many *Chimara's* and falſe concluſions may it happily diſcover in Naturall Philoſophy, that part *de Cœlo*, wherein they maintain a matter ſpecifically divers from that of the inferiours, that form *[illegible]*, and ſtrange affections, that they are impervious or ſolid, and conſiſt of almoſt innumerable Orbs. Theſe and many other enormious Tenents of the Peripatetick, the pure Aſtronomer laughs at as meer figments of Mans brain, or *Entia rationis*, as they call them. Do you ſeek for any competent knowledg in Chronology? repair hither, where you muſt have the *principia conſtitutiva* of the Art, the Characters, *quæ temporis conſtituunt fines audaciæ computatorum, Scal.* What immediate aſſiſtance doth it afford to Geography? without which the Difference of Longitude could never be found out. I could go further, and humbly tell the religious, learned, and painfull Divine, he cannot cleerly underſtand ſome texts of Scripture, as the firſt Chapter of *Geneſis*, and many other places without ſome helps from us. Let the pretenders to the ſpirit of Revelation, and contemners of humane Learning, which (as the glory of *Oxford* Univerſity Mr. *Gregory* obſerves) are all Comments and Notes upon the holy Book, let them tell me what *Ahaz* his Diall was, and the meaning of the retroceſſion of the ſhadow, *2 Kings, Chap. 20.* if onely the ſhadow, I ſay, that it is no miracle, in ſome kind of Dials, as *Clavius* and *Nonius* do obſerve, let them tell me again, what is meant by that, that darkneſſe ſhould be upon the face of the Earth, and no Aſtronomer of all that Hemiſphere, except at Hieruſalem perceive it? If I would be extravagant, I could puzzle their infuſed gifts with that *13 Chap.* of *Revel. ult.* and make them betray their own ignorance, but I'le pretermit thoſe iron-ſouls, and ſalute the Phyſician, who, I dare boldly ſay, wants his right hand, if he be ignorant herein: May I give the Politicain ſome helps from this, let them take the Type or Draught of an admirably compoſed Government, the Sun and his attendants, the Sun like a King in his throne adminiſtring Light and Heat, they, again, in their ſeverall capacities, by a grateful reflexion, reciprocally returning the ſame benefits to him, and mutually to one another. Of what conſequence it is in Navigation and Husbandry, I need not expreſſe, becauſe it is ſo commonly known: *Seneca* makes it catholickly uſefull. *Quam juvat inter Sydera ipſa* (ſaith he) *vagantem divitum pavimenta ridere & totam cum auro ſuo terram.* And a little after; *Hoc enim punctum quod inter tot gentes ferro & igni dividitur, O quam ridiculi ſunt mortalium termini! punctum ſanè enim illud in quo navigamus, in quo bellamus, in quo regna diſponimus:* Lift up thy Eyes therefore unto thoſe higher Manſions, and more glorious Objects of thy actions.

Now, that, happily I have gain'd my good Readers affection to this Art, I ſhall next endevour to reduce *in breviſſimam quaſi tabellam*, the hiſtory of this famous Art, whereby I may further illuſtrate the worth of it, by obſerving to him, how it hath been ſtudied and practiſed by the moſt civill Nations of the World, the greateſt Princes, and moſt famous Schollers, and

how

how by an interrupted tract it hath been deduced to us with a continued addition of new experiments: for *ad inquisitionem tantorum una ætas non sufficit, ut tota Cælo vacaret. Sen. Lib. 3. Nat. Quæst.* That it had its originall with *Adam*, I verily believe, and so imparted to *Seth*, (whom *Josephus* mentions to have erected, (upon a Prophesie from *Adam*, that the World should be first drowned, then burned) two Pillars for the eternizing of it, thence by a lineall succession of the ante-diluvian Fathers, it was communicated to *Noah*, who doubtlesse had a great measure of knowledg in the performance of that wonderfull *Machina* the Ark, which was neer 100 years in building, from him it descended to the Patriarch *Abraham*, who instructed (although, *Lucian* declareth the Æthiopians to have delivered it to) the Ægyptians in this and all other Mathematicall Sciences, who afterwards became very eminent therein; so that *Moses* is said to be trained up in that kind of Learning. From the Babylonians and Ægyptians (in processe of time) it passed to the Greeks, as *Herodotus* testifies, and with him *Theon Alexandrinus in Aratum*, ἐδέξαντο δὲ αὐτὰ Ἕλληνες παρὰ Αἰγυπτίων καὶ Χαλδαίων: the same doth *Seneca* averre in his *Nat. Quæst. Lib. 7. cap. 3.* Some say, that *Thales Milesius* brought it first from thence to Greece, but I assure my self, that it was there before his time, witnesse *Homer*, who describes *Achilles* to be a Mathematician, else *Vulcan* laboured in vain, who made a Buckler for him, with the engravery of the Mundane Systeme. *Iliad. lib. 18.* neer the end.

Ἐν μὲν γαῖαν ἔτευξ', ἐν δ' οὐρανὸν, ἐν δὲ θάλασσαν
Ἠέλιόν τ' ἀκάμαντα, σελήνην τε πλήθουσαν
Ἐν δὲ τὰ τείρεα πάντα τά τ' οὐρανὸς ἐστεφάνωται, &c.

The Earth and Sea he first did place,
And next to that the Heavens maze;
Herein he fixt th' unwearied Sun,
And after him the full of th' Moon:
Lastly, the Stars he did insert,
Wherewith the Heavens were begirt.

After these we have recorded *Meton* the *Athenian*, and *Euctemon* to have observed the *Æstive Solstice:* next *Aristotle* that gallant man (who, me thinks, may challeng followers of his practise in this as well as his precepts in the rest) who testifies of himself; *Lib. 2. cap. 11. de Cælo,* that he saw *Mars* Eclipsed by the Moon. Not long after, *Timochares* and *Aristarchus Samius* about 300 yeares before our Saviour Jesus Christ, were famous; for the one observed the applications of the Moon to the Fixed Stars, this other the Summer Solstice, and publisht a Book entituled *De Solis, Lunæ & Terræ magnitudinibus*, which hath perished by the injury of times: hitherto Astronomie was but in its infancy untill *Dionysius Eratosthenes* and *Archimedes* 200 yeares before our Redemption, afforded their assistance, who were very industrious in the observation of the Tropicks. 160 yeares *ante Christum* flourished *Hipparchus, Rhodius*, who was a great Pillar of this Science, in that he attempted more laborious and Atlantick atchievements then any that did preceed, hence that of *Plinie Hipparchus consiliorum naturæ particeps*, and *Ptolomie* his ἄνδρα φιλόπονον καὶ φιλαλήθη. After his time History is silent of any notable herein, unlesse it were the Eastern *Magi*, who came

to

to worship by the help of that miraculous *Cynosure*, the most glorious Light that ever appeared to poore mortals: untill about the 90 year *post Christum*, when *Agrippa* and *Menalaus* a Roman, who were contemporary, and are sharers in Honour, the first, for observation of that ☌ of the Moon with the *Pleiades*, the other for many Astronomicall experiments canonized in *Ptolomie*. Presently after arose *Theon Alexandrinus*, who observed the Motions of the Planets, and is alledged by *Claudius Ptolomeus* the Ægyptian, and Master of Astronomy among the Greeks, who presently succeeded, and by his wonderfull pains under *Hadrian*, and *M. Aurelius Antonius*, Emperours, *Ab anno Christi* 125, *ad annum* 141, together certainly with immense charges, collected and compared Observations, whereby he made Tables of the Motion of all the Planets, &c. we may give him this Character. *Vir equidem tam stupendi ingenii, ut Astronomorum Corypheus quotquot huc usque fuerunt merito appellaretur.* By this time Astronomy, had got so much perfection and maturity, that one would have thought nothing more could be added to it; μετὰ τὴ μεγάλην συντάξιν; so that it kept this stay, untill more time and observation had discovered the truth and worth of this Science more amply to all Nations, especially after that, *Alexandria* a famous nursery of *Urania* was taken by the Mahumetan faction, which caused Learning together with its Professours, to spread abroad as far as *Arabia* and *Syria*, wherein *Albategnius* was founded about *anno Christi* 880, whose Observations about the Luminaries obliquity of the Zodiack, and of the Fixed Stars are of very great moment, and are at this present sure proof of his admirable skill. From *Africa* it was transported to *Spain*, where one *Arzahell* a Spaniard, about *anno Christi* 1080, was much esteemed, because he set forth publickly the obliquity of the Zodiaque observed by himself. About the same time, the Persians by their great endeavours made Astronomicall Tables, and the Emperour fixed the beginning of the year at the Vernall Equinox, which is yet strictly observed. By this time, the Ptolemaick Tables did wonderfully, *& toto quidem Cœlo errare*; from the truth of certain Observations, so that for the support and advancement of her self, *Urania* stirr'd up *Alphonsus* (about 1252 *Christi*) King of *Spain*, who invited an assembly of the most famous Astronomers, that then were, consisting of Jews, Arabians and Spaniards, and by their aid, and the expence of above 400000 Ducats, composed new Tables, called *Tabulæ Alphonsinæ*, which may justly appropriate to their Authour that of *Horace*.

Exegi monumentum ære perennis,
Regaliquę situ Pyramidum altiùs.

I've built him such a monument of fame,
No brasse, nor Pyramide, can yield the same.

These Tables divers Astronomers, *Blanchinus Anno* 1458, *Gauricus* 1524, *Hamelius* 1545, *Prugnerus* 1553, augmented and put forth anew. Again, in the same year 1553, *Purbachius* put forth Tables of Eclipses, grounded upon his own observations, after whom *Regiomontanus*, his Scholer, comparing the Ptolemaick and Alphonsine Tables together, and correcting them by his own Observations, put forth an *Ephemerides*, beginning 1476, until 1506, whose example *Joh. Stofler* followed, and from the year 1507, to 1556,

and

and *Leovitius* continued, writing *Ephemerides* from 1556 to 1606, yet notwithstanding all these able men, and their great industry, these Tables were but *unius ætatis*, and of a short continuance, being grounded upon a false *Hypothesis*, mistaking their Center, for *ex falsis premissis pleramque sequitur falsum*, so that untill *Copernicus* his time, about 1500: Astronomy attained to no great virility, who poizing his one 30 years Observations with others, at last found out, and discovered the true & genuine Systeme of the World, and composed new Tables, which *Rheticus* his Scholler reformed. By these *Reinhold* made the Prutenick, and *Maginus* publisht his, according to these Tables the same *Maginus* and *Scala* composed *Ephemerides, ab* 1581 *ad* 1630. *Stadius* also *ab* 1554 *ad* 1606. *Origanus ab* 1595 *ad* 1654. At this time the Favourites of *Urania* began to multiply, especially, when she had procured so honorable a servant as the noble *Tycho Brahe*, who by his wonderful diligence and utmost exactnesse in the *αὐτοψία* of the Stars, found that in the year 1563, that the great Conjunction of *Saturn* and *Jupiter* in *Cancer*, was not conformable to the Alphonsine, nor indeed the Copernican accompts, and by the apparition of that new Star in *Cassiopeies* Chair *A. C.* 1572, rectified the places of the Stars, which by the Copernican Tables did deviate a whole degree and more, he spent above 200 Attick Talents in the building of his *Arx Uraniburgica*, and framing of exquisite and large Instruments for the Restauration of Astronomy, as you may see in his *Astronomia Mechanica*, and although he hath incomparably excell'd all that ever was, or will be expected in his admirable observations, yet it must be confessed he framed from thence but a poor *Hypothesis*, being a mixture of the Ptolemaick with the Copernican, as *Bullialdus* doth fully demonstrate in his *Systema Phylolaicum*, and learnedly confute the same, so that still *ultima manus* was wanting to perfect thorowly this goodly Science: what he said of the Roman Nation, *non erat unius Romanam condere gentem*, we may safely attribute to this Art, that not one nor 100 ages and men could wholly compleat it, for *Tycho* died *Anno C.* 1601. 14 *November*, having left this name, that he was the Phœnix of Astronomy; and two of his Coadjutors *Longomontanus*, and the worthy *Kepler*, the latter whereof, I think was the most subtile Mathematician that ever was, his books which he hath wrote of divers subjects will easily testifie the same: he it was that invented the Motions of the Planets to be performed in an *Ellipsis*, which the painfull and learned *Bullialdus* hath curiously demonstrated. But here *Pedem figo*, I mean my Pen, lest of a Preface I should make a Treatise, and give my Reader some instructions concerning the present Work, and the occasion thereof.

Having for my own delight and recreation spent sundry yeares in the study of the Mathematiques, and particularly in the contemplation of this most famous Science of Astronomy, and having not yet published any of my labours, (though I must confesse I have been often urged by some of my intimate friends and acquaintance, who desire the restauration of these Sciences) I have now adventured, in my tender yeares, (lest I should burne like the subterranean oli-lean Lamps, and give no light abroad;) to communicate the following Tract to the view of the World, and especially to them who best know and discerne the excellency, true worth, and incredible profit of this Art. Had the Learned of this Nation published any thing of this nature in the English tongue I had been silent, but to the day of the writing hereof, they have not, and its my hap indeed to appear first upon the English

Theatre,

Theatre, hoping that others, (who are more able then my selfe) will second these my weak endeavours, that so this most noble Art, may become more known and famous in our English Nation.

But the path being slippery where none have trod before me, thou may'st perhaps meet with some præcipice, but I have thoroughout (as much as in me lieth) laboured to displace, and remove out of the way all such difficulties, and hindrances, as might any way interpose themselves, to hinder thee from enjoying a full and perfect knowledge, and fruition of these my painfull labours.

Neverthelesse, I am not ignorant, how that never any man living in his writing could please the fancy of all men, neither doe I expect to be the first: to please the envious I cannot, for they are resolute; to content the scornfull, I will not attempt it; to flatter the haughty, were much folly; to disswade the captious, were needlesse; and to perswade the Courteous, is unnecessary. Let every one doe as his genius doth best dispose him; take where he pleaseth, reade what he liketh, and leave what he liketh not. For my own part, I have with much diligence and industry waded thorough many ænigmaticall difficulties, and have removed and drawn back the Curtaine of darknesse from off our English Horizon, having un-vailed the beauty and marveilous composure of the Fabrique and Machination of the Visible World, and as it were display'd, and set forth the splendour and admired Harmony of the parts thereof.

And, although, it may seem strange (at first view) amongst them that are not much versed in Astronomy, that according to our Hypothesis, the Sun (who is the Fountain of Light) should rest in the Center of the World, having onely a motion about his own Center, and that the Earth (which of the most was there imagined to be scituate at quiet) should be no other then a meer Star, and have a Circular Motion in the middle of those Orbs we call Cœlestiall, yet I doubt not (though with some it may peradventure seem a Paradox) but that the judicious will grant it for no lesse then a reall verity. It's no new opinion, but a hidden truth, *terram moveri, Solem & Cœlum stare.* Many may think it a meer fiction we go about to establish, but if such there be, let them patiently read, and I then question not, but when they once come to see, how the apparent Motions of all the Planets in their Orbs depends solely upon the annuall Motion of the Earth, and withall consider their various and different positions in respect of the Earth, and their vicinity thereto at one time, and vast remotion at another (as they may perceive by my reall Demonstrations) I then question not, but they will be of my side, and will then understand their former errour, and may discern the fallacy of the Ptolemaick Systeme, and the absurd suppositions of his followers, who not content with those simple Motions Nature hath assign'd them, but fondly have devised a multiplicity of such Orbs and Circles as are not in Nature, that by help of them they might salve the *Phænomena.* But *Aristarchus Samius* (though the first Mathematician we read of in *Græcia*) no sooner beholding the Heavens and the Earth, but he conceived the true type thereof, and drew the reall image of the Visible World, with whom, *Pythagoras* and many other in those pristine times agreed, and, notwithstanding, this truth was much eclipsed by *Aristotle* and his favourites, yet the vail is now quite removed, and the truth cleerly appears in its own colours, in despight of *Fromondus, Morinus, Alexander Rosse,* or any, or all the greatest opponents

this day living. That this Copernican Systeme is proved by apodicticall Mediums, I am certain, see *Bullialdus* his *Systema Phylolaicum*, & *Galilei Systema Cosmicum*. I know nothing of worth opposeth it; No? saith my adversary, what think you of the Scripture? why, I answer, that whatsoever is there spoken of the Earths Rest, or the Suns Motion. *Psal. 92. Psal. 103. Eclesiast. 1. Psal. 18. Isa. 38. Eccles. 48, &c.* is to be understood: *Secundum nostram apprehensionem, & communem loquendi modum, non secundum rerum naturam*, as the Philosophers say; according to our apprehension and vulgar manner of speaking, and not according to the nature of the things; as that of *Genesis 1. Let there be two great Lights, the Sun and Moon*; doubtlesse, the Moon hath no innate Light, neither any competent proportion to the other Stars, so likewise understand of the ends and foundations of the Earth, the reason why the Scripture doth so speak: *Ego Dominus Deus docens utilia, Isa. 48:* the glosse hath it, *non subtilia*, so *Paul* to the *Corinth. Non enim judicavi me scire aliquod inter vos, nisi Jesum Christum & hunc crucifixum*, so much as will save our bodies and souls into eternall life, not Philosophy and needlesse questions, which do onely tickle the ear, as *utrum eadem sit natura Cœli & Elementorum? &c.* and the like disputable questions, in which if we will be satisfied, we must study Philosophy, and not make the holy Scripture the reconciler of those doubts, which are infinite. But if any be so refractory, he cannot assent to the Physicall truth, let him construe it as a meer *Hypothesis*, and I will return to my task in hand, the Book ensuing, which is divided into four parts. The first, conteins the Doctrine of Trignonometry, after the most easie way by Logarithms; The second, shews their farther use in Astronomy, wherein is laid down many Propositions of extraordinary use, few of them being yet treated of in the English tongue. The third, conteins [a New, acurate, facile and brief Theory of the Planets] newly devised by the Authour, wherein is plainly and succinctly delivered the Fundamentall grounds of this Doctrine of Astronomy, and how to calculate the Motions of all the Planets Trigonometrically, wherein I much dissent from all other Authours that have treated hereof in other Languages, and have delivered the same more methodically for practise, then any hath done before me, having for the avoiding of Multiplication and Division, made use of the Table of artificiall Sines and Tangents, whereby the Operation may be performed with far more ease and expedition: whereunto is annexed divers Propositions Astronomicall, to finde the Magnitude, Proportion, Diameters, Distances, Intervals of the Planets and Stars, and their Proportions one to another, mutually by the Doctrine of Triangles, and have also shewed in the second how to finde the Parallax of the Sun, Moon, and other Planets with marveilous speed and dexterity.

In the fourth Book, I have shew'd more artificially, how to calculate the true Motions of the Earth, Planets and fixed Stars, for any time past or to come, by new Tables, calculated according to the Doctrine of the third Book, whereby there true places from the Sun may exactly be obtein'd, by help of the Tables of Æquation, but the Parallax of the Earths Orbe, is to be acquired Trigonometrically, and is as easily perform'd by the *Canon* of artificiall *Sines* and *Tangents*; as it could have been, should I have taken the paines to compute particular Tables to attaine it.

In every part whereof, I have used as much plainnesse and brevity as could be possible, insomuch, that men of meanest apprehensions may with a little

care and practise, in short time, come to the perfect understanding thereof.

In which Worke I have principally made use of the late Observations of Noble *Tycho Brahe*, who by help of his large and curious Instruments, did lay so good and firm a plat-form and ground worke for the restauration of of Astronomy, that *Kepler* and some others since his death, have very much revived the Art, so that by their helps, we now know the exact quantity of all their Orbes and Sphæres, and their true proportions one to another, wherby we are enabled to Calculate the exact Course and Motions of either Sun, Moon, or other Planets *ad punctum*, which before could not be attained to by some degrees.

Lastly, I desire the judicious Reader, if he chance to meet with any *Errata's*, (as some may happen in a Work of this nature) that he would courteously amend them, and not with Cavillation ungratefully requite my painfull Labours. Happily, if this finde acceptance, it will encourage me shortly to publish some other thing, which perhaps may give thee much satisfaction, and be commodious to my Countreymen of *England: Valete.*

Yours, and *Urania's* Servant,

Vincent Wing.

To his Ingenious Friend

Mr. *VINCENT WING*,

VINCENT, thy Book so out-soares ev'ry thing
Formerly writ, that sure each leaf's a WING
Of high-flown *Fame*, which nimbly through the *Skie*;
Faming thy praises, 'bout the *World* will flie:
There's not a *Signe*, a *Planet*, nor a *Star*,
But thou with them as well acquainted are,
And can'st as eas'ly call them by their names,
As I our *Tom*, our *Will*, our *Jack*, our *James*.
At first perusall of thy *Book*, I see
Such wry-mouth'd *words*, seem'd *Heathen Greek* to mee,
Quotus, *Parallax*, I threw't by for fear
I might have made old *Belzebub* appear,
But recollecting of my *senses*, I
Perceiv'd them phrases in *Astronomie*.
Sure thou do'st guide the *motion* of the *Sphears*,
The *Sun*, the *Moon*; Nay, it plainly appears,
That they nor *rise*, nor *set*, nor *change*, but when
Thou do'st direct with thy *Prophetick* Pen.
It is observ'd, the *Waters* here below,
When thou comand'st shalt *ebb*, comand'st shal *flow*,
To get their *Harvest*; divers would despair
Should not thy *Almanack* say t'would be *fair*;
Poor *Husbandmen* unto it trembling goes,
To see how many *Frosts*, how many *Snows*,
And they according as *WING* shall descry,
With fodder store themselves accordingly:
In'it thou tel'st us that in fifty two,
Wee'st have a strange *Eclipse*, why could'st not thou
As well fore-told us of these *Times?* and so
They might have been prevented long ago,
Thou'rt censur'd for't, but sure they do thee wrong,
In saying thou wast brib'd to hold thy tongue.
Prethee hence-forth if *Wars* this *Land* divide,
Dear friend direct me, to be of th'right side,
For which (but that my unpolisht Verses will
Rather detract, then add unto thy skill)
I should extreamly pride my self to pay
A Paper Off'ring to thee ev'ry *day*.

Math. Dale.

IN

HARMONICON COELESTE,

V. Wing.

LEt *Poets* tell us after this the Skies
Have feaſted *Heroes* with their Deities,
While thy great *Genius* may not only come
Into the Cellary, or Dining Room,
But ſearch thoſe Cloſets, whoſe Retirements are
Coverts, for all that's ſecret, all that's Rare.
Let the *Arabians*, whoſe Philoſophy
Hath chriſten'd all the Pariſh of the Skie,
For Names, and Styles of Conſtellations look
In Heavens Muſter-Roll, as their Church-Book:
While thy new Scheams their older Tables can
Confute as th' Bible doth their *Alcoran*.
Whil'ſt thou do'ſt from new principles Divine,
Each ſeverall Planets maze through every Signe:
May we believe each Planet would be led
By thee, and by thy more then *Cretan* thred
Shape their own paths, whilſt no obliquity
Can hide, or counterchange its ſteps from thee.
We wiſh the Brags of Ancient Arts were true,
That they might adde more Luſtre to thy new,
By being excell'd, or that it had not long
Been prov'd untrue that a *Theſalian* ſong
Can by ſtrong charms unſtar the *Hemiſphear*;
The ſtartled world to ſilence that, would hear
How to thy Numbers each intelligence
To ſtudy their own Orb deſcended thence;
And how the unbodied movers did conſpire
To take from thee, the art of their own Quire.
From thy own Pen, all that Antiquity
Accounted Legends, is mad Hiſtory;
As that *Endymion* from a Mountains height
Embrac'd the watery Goddeſſe of the night;
We plot not now to finde the *Metaphor*,
Or miſ-believe the fact, but ſcorn it for
A trifle: ſince one reach of thine from thence,
Graſpes the *Firſt movers vaſt Circumference*.

Let

Let *Archimedes* ask no more of *Jove*
A place to set his Vice, since thou canst move
The Earth without it, let him now dis-use
Those by his practise still unfasten'd screws,
And learn from thee that to move earth and men,
There needed but one tool, and that's a Pen.
Now in all these, thy Work not mine is done,
I faintly shrink from what I had begun,
And finde the feet of Verse too slow to tread
Those measures thou, and swiftest Orbs do lead:
Yet shalt thou not remain unprais'd by me
Some constellations shall thy Garland be
To stud thy Temple with more Stars then those
That thickest, *Ariadnes* Crown enclose

IN LAUDEM OPERIS ET AUTHORIS:

TO build a *Palace* rarest Stones are brought
From forreign places, and chiefe *Masons* sought:
For *Princely Ships* best *Timber* is collected,
To frame the same choice *Shipwrights* are selected.
The learn'd *Physicians*, such as were of old,
Hippocrates and *Galen* lie and mold;
Now *Paracelsus* clayms the curing part,
And most men practise the *Spagyrick Art*.
Great *Ptolomy* Astronomie's chiefe Prince
Left the *Earth fixed, and not moving:* Since
Copernicus, by a supposed skill,
Findes the *Earth moving*, and the *Sun stand still:*
And many Learned Tracts are daily pen'd,
One to oppose, another to defend;
Thus when we *Steel* and *Flint* together smite.
We kindle *sparks*, and those *sparks* give us light.
Alphonsus spent a masse of gold to finde
The heavenly Motions: *Tycho* not behinde
In that great Work, made Instruments so large
And costly, that they did surmount his charge.
Kepler profound did perfect that rare Frame,
And left behinde an ever-living Fame.

 Th'*Al-*

Th' *Alphonsine* Tables seldome now are thought
Upon; the *Prutenicks* but rarely bought;
We'have try'd the *Danish*, The *Richelian*
Lansberg's and *Argols*; the *Copernican*,
Eichstadius and the learned *Bullialdus*,
And many others, but all somtimes fail'd us,
And by their various workings almost dul'd us.
And in conclusion we doe finde them differ
In many matters, all not worth a *Cipher*:
For *Tycho Brahe Phœnix of the Art*
Lay'd the foundation; They did act but part,
And here and there did alter, add, and frame,
What they deficient thought, to get a name,
W'have markt fore ages, and this age too, when
Books drop from every common undipt pen,
And those too patcht, imperfect, blinde and lame,
And all still write, but diversly, the same:
Tycho was *Phœnix Vincens*, here's a *WING*
Of that rare *Bird*, which faithfully doth bring
Us welcome news from Him, and from the rest
Or He, or none, hath found the *Phœnix Nest*,
And like it is to be proclaim'd by Fame,
HARMONICON COELESTE call its name.
Th' *Hypothesis* is firm, not built on Sand,
In praise of which and whom, I put my hand.
For I foresee, and verily believe,
As long as there is time, *This Work will live*.

John Booker.

IN
HARMONICON COELESTE,
Vincent Wing.

THe *Eagls Wing* but to the *Skie* can soar,
And this our *Wing* hath reach'd as well as he,
Nay! this our *Wing* is *Vincent*, and far more,
Attained hath the *Fixt Stars* in degree:

And round about the *Heav'ns* rides in a day,
With *Phaeton*, but hath far better skill:
The snorting *Pyroeis*, and *Æthous* way,
Both *Phelegon* and *Eous* to guide at will.

His nimble *Wings* ne singe, nor doth he melt
With *Icarus*, such boyes set all on fire;
This our *Wing Salamander*-like hath dealt,
And yet not scorcht, though climbe he doth far higher.

THEN:

COrripe lora manu, nec sit mutabile pectus
In te, consiliis utere tuque tuis.
Macte tua sic Arte brevi facis iter ad astra
Uraniæ *pandis commodiusq; vias.*

Tu *solem medio*, Tu *regia Sydera quinq;*
Tu *pingis* Phœben, *perge, & Amice vale.*

G: A.

To the Author, M^r^. Vincent Wing.

THy Book needs not desire a greater fame,
It's a sufficient Title to'have *Wing's* name,
Let *Zoyle* alone, his envie's far below
That Art thou here unto the World dost show:
My name-sake *Johnson* with his sacred laies,
Had he now liv'd, could not augment thy praise;
So neighbour *Wing* I'de have thy name to fly
Still upwards, towards the *Azure Canopie.*

Your loving friend

Edward Johnson.

TO THE READER:

IN

Praise of the Art *and* Author.

SAcred *Vrania* envites them to draw nigh,
And be partakers of her *Harmony*;
Whose *Wing'd* ambitions elevate their eyes,
To view the order of the Spangled Skies:
There they may see the Sun in th' Center, and
The other Planets (by the strict command
Of their Creator) moving day and night
About the Sun, the Fountain of their Light:
There they may see the *Zodiaque* beautifi'd
With various Figures curiously contriv'd;
And all the heavenly Constellations stand
Perpetuall Centinels at *Jove's* command.
Reader, peruse this Worke, where thou shalt see
Th'very *Elixir* of *ASTRONOMIE*.
First, there are perfect Rules resolving all
Triangles, whether *Plain* or *Sphaericall*,
And then their application doth appear
In severall Propositions of the *Sphaer*:
Then there's a perfect *Theory*, whereby
You may (with speed) by *Trigonometry*,
Compute the Planets *Longitudes*, and see
When *Sol* or *Luna* shall Eclipsed be:
Thank then my Friend, who out of love to us,
Hath, from the dead, raised *COPERNICUS*.

Fare ever well, so ever wishes he,
Who is more yours then he can seem to be:

William Leybourn.

There is a very [illegible] booke of this nature [illegible] to find only the motions of the planets by [illegible] A helpe to Calculation.

The [illegible] place to buy bookes is in Duck lane [illegible]

AN INDEX,

SHEWING THE CONTENTS OF THE FOVR BOOKES OF Harmonicon Cœleste.

THE FIRST BOOK.

THE SECOND BOOK.

Having

THE THIRD BOOK.

Of

The Index.

The Fourth Book.

To

In the Appendix.

An

The Index.

An Index of the Tables contained in the fourth Book.

Courteous Reader,

In a work of this nature it's impossible to escape some mistakes : Quid enim est familiarius homini quàm hallucinari ac errare? *which mankind could never totally evade since the first lapse of his great Grandfather* Adam. *This present Tract is lyable to the like inconvenience, and hath some few* Typographicall *errours : neverthelesse (though the Author were far remote from the Press, yet) by the care and diligence of the Printer, there are not any considerable faults escaped, most of them being only literall, which I desire thee candidly to correct in manner following.*

Pag.7.lin.16.r *collectorum*. p.18.l.32.for 6 51.51.51.r.6.15.15.51. & l.*ult*.r.Characteristique. p.30.l.6 r.whose complement ON. p.43.l.26.f.or r.of. & l.34.*dele* most. p.46.l.41.r.revolution. p.47.l.14.r.the Arches of the Æquinoctiall. p.49.l.1.r.Elliptique. p.50.l.7.f.HX r.XH. & l.19.r.Angle DHN 02 15 26. p.51.l.42.r.$6' 41''$. p.52.l 27.r.PBQ.& l.43.r.ANM.& l.44 r.ONM. p.54.l.8.*dele* A.& l.19.r.$46^d 12' 4''$. p.55.l.4.r.DN4047. & l.44 f.$14'$ r.$41'$. p.56.l.26.r.$41^d 52' 42''$. l.*ult*.r.$174^d 54' 6''$. p.57.l 4.r.$174^d 54' 6''$. p.59.l.3.r.descending. p.61.l 1.r.therefore. p.63.l.34.r.towards the Perihelion. p.65.l 34.r.in ♂ 4916. p.68.l.4.f.Compl.r.Argument. & l.12.*dele* which is the difference. & l.13.r.this, at S *dele Comma*. p.72.l.11.r.$0^d 1' 21''$. & l.39.r.$52^d 22' 45''$. p.77.l.47.r.planes. p.82.l.18.r.$22^d 40' 55''$. p.83.l.31.r.$2^s 12^d 51' 1''$. p.84.l.3.r.678512. & l.14.r.712450. p.85.l.15.r.following Book. p.87.l.6.r 38640. p.94 l.39.r. HI. p.95.l.18.r.centrall. p.96.l.29.r.angle HDS. p.96.r.DH 152040 *& sub Rad*.r. 6.073314; 5.181958; 1.255272. p.101.l.27.r.GL. p.112.l.35.r.days 8.p.127.l.12.r.10.19.30. & l.15.r.5^d De. & l.30.r.7 90966 p.134.l.15.r, *Lib*.3 & l.22.r.*Cap*.32. p.155 from *Anno* 1585 *Novemb*.14^d 18^h $10'$ r.Observations of Mercury. & l.43.r. ♊ $23^d 16'$.

In the Tables.

Pag.166.lin.10.col.2.r. 9 9 30 16. p.167.l.35.c.4.r. 101582. p.168.c.4.l.30.r.100186. p.169.c.6.l.18. r.38 43. p.170.c.3.l.8.r. 9 10 14 55. & c.4.l.9.r. 4 14 21 46. & c.2.against May r. 4 21 10 2. & against Ho.27.r. 14 49 24. p.172.c.3.l.10 r.4 19 30. p.173.c 7.l.10.r.3894. p.183.c.4.l.24.r.1628. p.187.c.3.l.24.r.8 2600. p.189.c.3.l.14.r.5 53 18. p.193.c.3.l.19 r. 1 5 39. p.194 c.4.l.21.r.530778. & l.27.r.528274. & l.29.r.527425. & l.37.r.523967. & l.38.r 523530. & c.7.l.21.r.517337. p.201.l.42.*dele* though. & l.43.r.though for my part. p.203 against 3^d r. 4 48 23. p.208.c.3.l.41.r. 0 20 25 50. & c.7. l.19.r. 13 55. & l.20.r. 15 39. p.210.c.4.l.30.r.41364. & c.7.l.10.r.39906.

Page 192. The mean motion of ♃ in Moneths of the Common year is thus to be corrected.

	Com.Y Lon. ♃ d ′ ″		Com.Ye Long. ♃ d ′ ″
	0 00 0		00 00 00
	0 02 0		02 34 37
	0 04 0		04 54 17
	0 07 0		07 28 54
	0 09 0		09 58 31
For	0 12 0	*read*	12 33 09
	0 15 0		15 02 42
	0 17 0		17 37 24
	0 20 0		20 12 02
	0 22 0		22 41 40
	0 25 0		25 16 17
	0 27 0		27 45 55

In the Diagrams there are some few Letters omitted by the *Cutter*, which by diligent reading may easily be inserted ; and some other small faults thou maist meet with, but they are not worth the noting here.

HARMONICON COELESTE: OR, THE COELESTIAL HARMONIE OF THE VISIBLE WORLD.

The First Book.

THE first Book containeth those necessary and immediate Elements of TRIGONOMETRY abstractly propounded, which as the foundation to the super-structure, are laid down in a due Method and compendious manner; And although, I confesse, they have been already learnedly and carefully handled by divers of my Countreymen; Master *Briggs*, Master *Gunter*, Master *Norwood*, Master *Gelibrand*, &c. Yet to supply the scarcity of those Books, and to furnish my Reader with all expedients for the due understanding and practising of the intended matter, I have taken the paines to extract the most ready and easie Resolutions of their Propositions, having succinctly, by the new way of Art in Species, demonstrated their effects, according to that Doctrine delivered to us by the Right Honourable Lord *John Neper*, Baron of *Marchistan*, in S. and with him, Mr. *Norwood*, especially following Dr. SCARBOROUGH, that rare Analyst, and much deserving in these Sciences, omitting their Illustration in Numbers, whereof you will finde variety of Examples in the subsequent Tracts. Lastly, I have set down compendiously the use of the Tables of LOGARITHMES, and the work of Astronomicall Fractions.

CHAP. I.

1 IN the speculation and practice of Mathematicks, the Triangle may challenge the superiority of all Geometricall Figures, by whose assistance we can measure the Earth, compasse the Sea, survey the Capacities, and know the Distances of those glorious Creatures the Starres.

2 A Triangle is a Figure consisting of three angles and three sides, whereof three things must be knowne, called *Δεδόμενα*, noted thus (|) to finde any of the other three, which we call *ζητούμενα* marked with (⁞⁞)

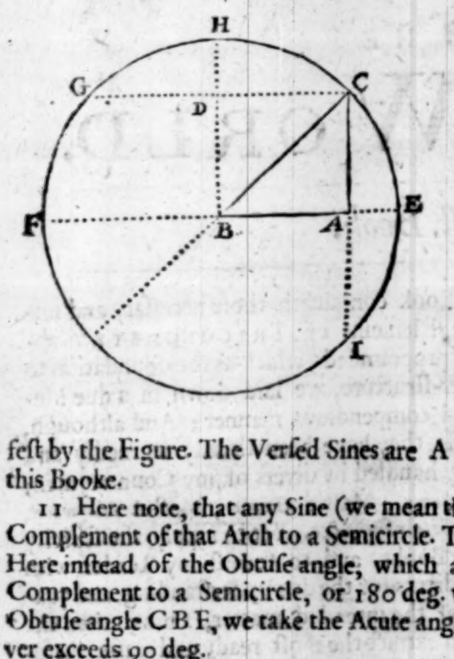
3 A Triangle upon a Plane is right lined, upon the Sphere, circular.

4 Againe, a Right lined Triangle, is either right angled, or oblique.

5 A Right angled, right lined Triangle, noted with A B C, we speake of first, whose sides then related to a Circle, are inscribed totally, or partially.

6 Totally, if the side subtending the right Angle, be made the Radius of a Circle, then all the sides may be called Sines (which is a term of Art borrowed from the Arabians) namely, B C subtending the Right angle *Sinus totus*, the other two containing the Right angle *Sine & Co-sine*, because one is the Complement of the other to a Quadrant.

7 A Sine *in genere* is either Right or Versed.



8 A Right Sine *in genere proximo*, is alwayes halfe of the subtendant of the double Arke, which you see when the sides are increased.

9 A Versed Sine is perpendicular to the Right Sine from the term of the Arke, which of the Ancients is called *Sagitta*.

10 As in the Triangle B A C, B C is the Radius, or whole Sine, B A *Sinus simpliciter*, or first Sine, (according to former Writers) B A = D C is the Complement of the former, we call it the Cosine, and write it usually thus (c s.) each of these Right Sines are halfe of the Chords of the double Arch, as is manifest by the Figure. The Versed Sines are A E and F A, whereof we make no use in this Booke.

11 Here note, that any Sine (we mean the right Sine) is as well the Sine of the Complement of that Arch to a Semicircle. Thus C A is the Sine of the Arch F G H C. Here instead of the Obtuse angle, which alwayes exceeds 90 degrees, we take its Complement to a Semicircle, or 180 deg. which will want of 90. So instead of the Obtuse angle C B F, we take the Acute angle C B E, hence our Canon of Sines never exceeds 90 deg.

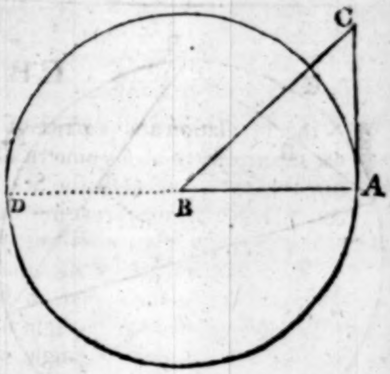
12 A Rectangle Triangle is said to be partially inscribed, when applyed to a Circle, one of the sides containing the Right angle, is made the Radius, then shall the other side be a Tangent, because it is a contingent, and the Hypothenuse which subtends the Right angle shall be a Secant, for that it cutteth the Circumference, and is extended beyond the same.

13 A Tangent of an Arch or Angle then we may define to be a right line perpendicular to the Radius, touching the Circumference, which belongeth to the Complement of that Arch to a Semicircle, as well as to the Arch it selfe.

14 A Secant is a right line proceeding from the center of the Circle, and extended

ded thorow the Circumference to the end of the Tangent, whereof we shall make little or no use.

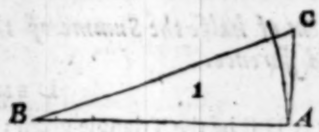
15 In the Diagram C A is a Tangent to the angle D B C, as well as to C B A, and likewise B C is a Secant to either.



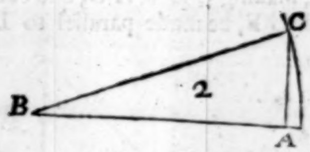
16 In all the premises take notice, that any side may be put as the Radius, and is the Reason of varying any proportion, that the Radius may be put in the first place to avoid Substraction, and taking off the Arithmeticall Complement.

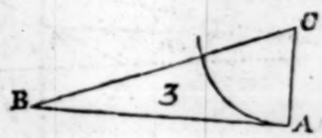
t C A, sec. B C, (1) :: s. C A Rad. B C, (2) :: Rad. C A, sec. B C, (3)
Againe, t. C A, Rad. B A, (1) :: s. C A, s. B A (2) :: Rad. C A, t. B A (3)

17 From hence it is manifest. That, As the Sine of an Angle, is to the Radius. So is the Radius, to the Co-secant of the said Angle: and Tangent to the Secant; and by conversion.



18 It is evident too, As the Tangent of an Arch, is to the Radius; So is the Radius, to the Co-tangent; So the Sine, to the Co-sine of the same Arch, *& contra*. Secondly, we may take this Corrolary. That, the Radius is a mean Proportionall betwixt the Sine and Co-secant of any Arch, and likewise betwixt the Tangent and Co-tangent.



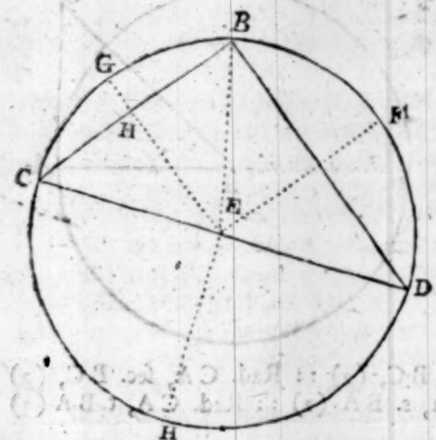


CHAP. II.

1 Hitherto of Rectangles, we proceed next to some affections peculiar to all plain Triangles *in genere*, but were intended chiefly for the solution of oblique angled *in specie*: we will deliver them generally, and apply them in particular.

2 ***In all plain Triangles, the sides are proportionall to the Sines of their opposite angles***, & contra.

DEMONSTRATION.



Let B C D, be the Triangle given, inscribed in the Circle: from the Center E, let fall the Perpendiculars E H, E G, E F, which must bisect the Chords and their Arches (by the 6 L. 3 P. Elem) Draw likewise B E, the Radius. Now because B E G angle = B D C angle, (by 20 P. 3 Elem. &c.) therefore the halfe of the sides shall be the Sines.

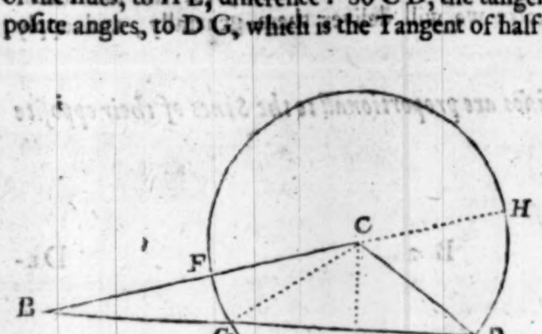
Therefore B C, C D : : H B, to E D. For as the whole, is to the whole, So the halfe, to the halfe.

3 In all plain Triangles, *As the Summe of two of the Sides, is to the difference of the same Sides, So is the Tangent of halfe the Summe of the opposite angles, to the Tangent of halfe their difference.*

DEMONSTRATION.

Let A D E be the Triangle given: A D, A E, and A, knowne; extend A E, toward C, making C A = A D, and cutting off A H = A D. Produce C D, towards G, untill G E, be made parallel to D H; Hence it followes, that in the Triangle A D H, D = H, and also in the Triangle C A D, C = D, therefore, Angle C D H, = H + C, therefore Angle C D H, is a right angle, (by the 32 of the 1 Elem.) And because G E, is parallel to D H, therefore Angle G E H = D H C, (by the 29 of the 1.) and G is a right angle, and likewise H D E = D E G, by the same. Moreover D H A angle = H D E angle + H E D angle, (by the 32 of the 1.) Put A D H, common to both, then it follows, that the angle A H D + angle A D H = A D E + A E D, therefore A H D = $\frac{A E D + A D E}{2}$. Now therfore (by the 2. of the 6.) As C E, the summe of the sides, to H E, difference: So C D, the tangent of half the summe of the opposite angles, to D G, which is the Tangent of half their difference.

4 *In any plain Triangle, As the Base is to the sum of the sides, So the difference of the sides, to the difference of the segments of the Base.*



In this Triangle B C D, B D, is the Base, B H the summe of the sides, the difference of the sides B F, the difference of the segments of the Base B G, since C A the Perpendicular doth bisect G D.

G D. Now therefore by the 36 of the 3 of *Euclid*: B F $\times$ B H = B G $\times$ B D, therefore they are proportionall.

5 These Foundations being thus laid, the πραγματεία, or business of plain Triangles is easily dispatcht. The Rectangular I note with the letters A B C, A at the right angle, C at the Cathetus, B at the Basis, So shall A B represent the Base, C A the Cathetus, B C the Hypothenuse, by a neat Artifice. And that there be no confusion in the workings, note the things given with this stroake (|) The Quæsita with three pricks thus in an Angle In a Side soe

Orthogonii Diatyposis:

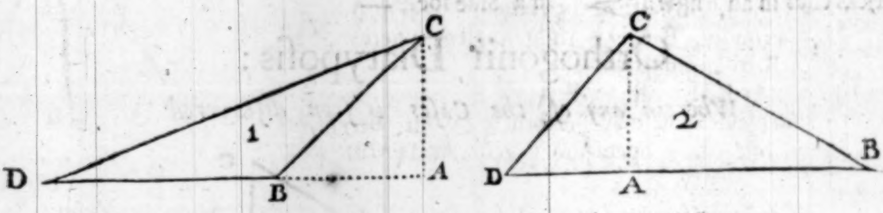
Wherein any of the Cases is soon discovered.

	Data.		Quæsita.		Analogia.
	Sides.	Ang.	Sides	Ang.	::
1	B A. C A	Conterm. { B C	C A B A	} Opposit.	R. t B :: B A. C A R. t C :: C A. B A
2	B C B C	B C	C A B A	} Opposit.	R. s B :: B C. C A R. s C :: B C. B A
3	B A C A	Opposit. { C B	B C B C		s C. R :: B A. B C s B. R :: A C. B C
4	B A & C A			C B	C A. B A :: R. t C B A. C A :: R. t B
5	B A. B C B C. C A			Opposit. { C B	B C. B A :: R. s C B C. C A :: R. s B
6	B A. C A		B C		Duplici operatione perficitur. 1 B A. C A :: R. t B 2 s B. R :: C A. B C Or in one by the Chiliads. $\frac{\text{Log. } BA \times 2 + \text{Log. } AC}{2}$ $\times$ 2 is equall to the log. of B C.
7	B A. B C or B C C A		C A. B A.		It may be performed by a double worke, but Mr. *Briggs* Cap. 16 & 17. Arith. Logarith. demonstrates a more artificiall in one by the Chiliads. Log. B A + B C plus. Log. B C − B A divided by 2 = Log. of C A.

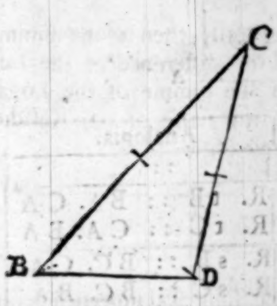
In

In oblique angled plain Triangles.

6 This Triangle I alwayes note with the letters B C D, and obſerve that if an Angle be given, together with one of the ſides containing it, let that Angle be noted with B, and the ſide with B C, ſo that a perpendicular let fall from C, ſhall diſtinguiſh the Baſes of the partiall Triangles.



In the firſt where the perpendicular falls without, which alwayes comes to paſſe when B is obtuſe, or D, but fals within, if both B and D be acute, ſo that in the firſt D A − B A = D B. In the ſecond D A + B A = D B.



7. Firſt, ***Two ſides being given, and an Angle oppoſite to one of them, to find an angle oppoſite to the other ſide,*** & contra.

B C : : oppoſite. s. D : : C D : oppoſite. s. B.

8 Here note, that if the given angle be obtuſe, the oppoſite ſide to it will be greater then either of the reſt, and the other two angles ſhall be acute,

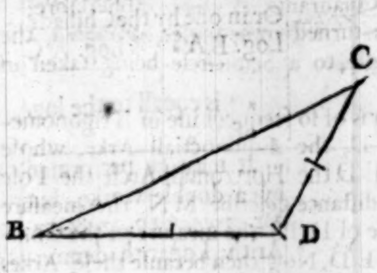
But if the given angle be acute, it will be doubtfull whether the angle oppoſed to the greater ſide be obtuſe or acute, yet will it be a true Sine of the fourth Proportionall, which may appertaine to the obtuſe, as well as the acute, as we made plain before.

9 That therefore we may know this angle, compare the greateſt ſide with the leaſt or the meane ſide : take the ſumme and difference, and if the half of theſe Logarithmes be equall to to the Logarithme of the third ſide remaining, the angle oppoſed to the greateſt ſide is a right angle, if greater, obtuſe, if leſſer, it ſhall be acute.

10 Secondly: ***Having two Sides, and the Angle comprehended, to find either of the Angles remaining.***

$BD+CD : BD-CD :: t\frac{C+B}{2} : t\frac{X}{2} = \frac{1}{2}$ the diff.

Then $\frac{C+B}{2} \begin{cases} +\frac{X}{2} = \text{C the greater.} \\ -\frac{X}{2} = \text{B the lesse.} \end{cases}$



Expreſſed in words. As the ſumme of the ſides : to the difference of the ſame ſides : : So the t: of ½ the Angles unknown, to t: of ½ their difference.

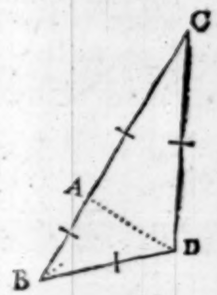
Thirdly,

11 Thirdly, *Having the three Sides of an oblique Triangle, to find any angle.*

Two Workes required.

Analogia prima.

As the greatest B C,
To the summe of the others; C D + B D.
So is the difference of them, C D – B D.
To a number; which being substracted from the whole Base, towards the beginning of the mean side C, the Perpendicular shall fall in the halfe of the Remainder, as at A.



Then secondly, B A D is right angled, wherein B D, and A B are given to find B.

As B D : R :: B A : cs B.

12 If you please you may perform it by Mr. *Briggs* his Rule, when one onely operation is required. (Arith. Log. Cap. 16.)

De dimidio collectorum Laterum, sigillatim latera subducantur; & summa Logarithmorum semissis summæ laterum, & differentiæ lateris Angulum quæsitum subtendentis, auferatur è summâ Logarithmorum reliquarum differentiarum, & duplicati Radii, semissis reliqui erit Logarithmus Tangentis semissis anguli quæsiti.

From the half of the collect sides, substract each side severally, then let the summe of the Logarithmes of half the summe of the sides, and the difference of the side which subtends the required angle, be substracted out of the summe of the Logarithmes of the other differences, and the doubled Radius, the halfe of the Residue shall be the Logarithme of the Tangent of half the required angle.

CHAP. III.

1 A Sphæricall Triangle is a Figure described upon a Sphærical superficies consisting of three Arkes of the greatest Circles of the Sphære, every one being lesse then a Semicircle.

2 The greatest Circles of the Sphære are those which have each the same common Center, that the Sphære hath, and divide one another, as well as the Sphære into two equall Parts or halves: hence.

3 Lesser Circles are those which have peculiar Centers, and divide the Sphære unequally. (Theodos. Prop. 6. and 11 lib. 1.)

4 A great Circle passing through the Poles of another great Circle, cut one another at right angles, *& contra* because,

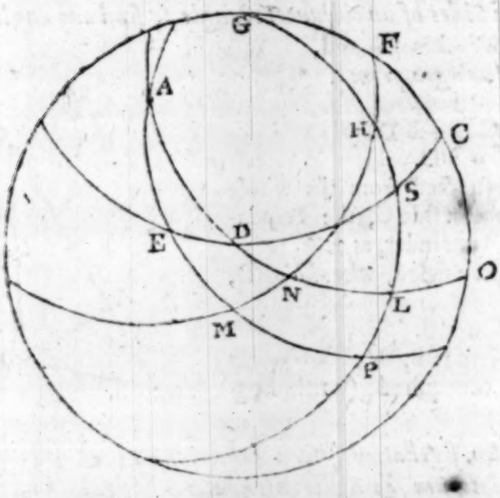
5 A Sphæricall angle is measured by the Arch of a great Circle, described from the angular point betwixt the sides continued to Quadrants, *& contra.* Therefore,

6 The Sides of a Sphæricall Triangle may be turned into angles, *& contra,* the Complements of the greatest side, or greatest angle, to a Semicircle being taken in each conversion.

It will be necessary to demonstrate this, which is of so frequent use in Trigonometry. Let G F O be the Æquinoctiall Colure, A D, the Æquinoctiall Arke, whose Pole is F. A E the Eclipticall Arch, the Pole H. E D the Horizontall Arch the Pole G. Now then at the Center A, and Quadrantall distance describe M N, the measure of the Angle A. In like manner O C, the measure of D. PS. the measure of the Complement of E, in the same Sphæricall-Triangle A E D. Now then because these Arkes M N, P L, O C, are by 90 deg. distant from A, E D, therefore being protracted they shall each go through two Poles of the said Circles. Then F N = M H, from both which if you substract N H, will leave M N = H F, and by the same reason C O = G F, and PS = G H, &c.

7 The three sides of any Sphæricall Triangle are lesse then two Semicircles.

8 Every



8 Every Sphæricall Triangle hath his three angles greater then two Right angles, from whence it appears, that knowing two, you cannot know the third, as in plaine Triangles.

9 If the Arch of a great Circle shall cut the Arch of another great Circle, it shall form two right angles, or two angles equall to two right angles.

10 If two Arches of great Circles shall intersect one another, the verticall angles shall be equall.

11 If two sides of a Sphæricall angle be continued, they shall each intersect again *per Semicirculum*, and shall form an angle equall to the former opposite angle.

12 In a Rectangle Sphæricall Triangle, the sides are of the self-same affection, that the opposite angles are of.

13 In a Rectangle Sphæricall Triangle, if one side be a Quadrant, the Hypothenusall shall be a Quadrant, if both be of the same affection, the Base shall be lesser then a Quadrant, if they be of divers affections the Base shall be greater then 90, *& contra*.

14 In an Oblique angled Sphæricall Triangle, if the angles at the Base be of the same affection, the perpendicular let down from the third angle, shall fall within, if they be divers it shall fall without.

These generall affections being knowne, we will next proceed to the Particular.

CHAP IV.

PROP. I.

In all Sphæricall Rectangle Triangles having the same acute angle at the Base. The Sines of the Hypothenusaes are proportionall to the Sines of their Perpendiculars.

LEt ♎ Æ ♈ P be ¼ of the Sphære, ♈ Æ ♎ half of the Æquinoctiall Plane, whose Pole is P. ♈ ♋ ♎ ½ of the Ecliptique, ♈ P ♎ ¼ of the Æquinoctiall Colure, P ♋ Æ ¼ of the Solstitiall Colure, P M, ¼ of some other Meridian. Now because the Colures cut the Æquinoctiall at right angles, the Ecliptique at oblique angles, in this quarter of the Sphære, there are found two Rectangle Sphæricall Triangles, ♋ ♈ Æ, and E ♈ M, whose Hypothenusaes are ♈ ♋ and ♈ E, the Catheti ♋ Æ, E M, the Bases ♈ Æ and ♈ M. They have also the acute angle ♈ common to them both. Now then, the Sines of the Hypothenusaes are I ♋ the whole Sine, and the Sine N E; the Sines of the Perpendiculars ♋ A, and E L.

Because the Triangles ♋ I A, and N L E are alike, (for that ♋ A, and E L, are Perpendiculars, and ♋ I and E N Parallels, having the selfe same inclination, being both in the Plane of the Ecliptique) therefore N E L and ♋ I A are æquiangled: Hence,

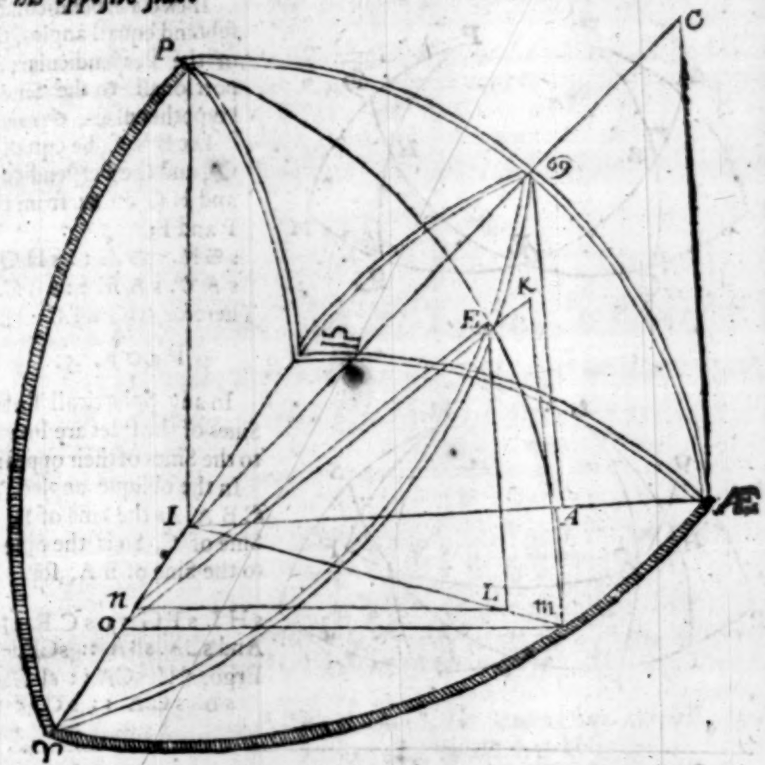
s I ♋ : s N E :: s ♋ A : s E L, & contra.

Therefore it followes in the Triangle ♈ E M.

R : s ♈ E :: s ♈ : s E M.

As

As the Radius, is to the Hypothenuse, so the Sine of any other angle, to the Sine of his opposite side.



PROP. 2.

In Rectangle Sphæricall Triangles, having the same acute angle at the Base.

The Sines of the Bases, and Tangents of the Perpendiculars are proportionall.

In the preceding Scheme, and the same Triangles ♈ ♋ Æ, and E ♈ M; I Æ, and O M, are Sines of the Bases, C Æ and K M, Tangents of the Perpendiculars.

Because the Triangles I C Æ, and O K M, are similar, according as it was before demonstrated: Therefore, s I Æ. s OM :: t C Æ. t K M. *& contra.*

Hence another Consectory.

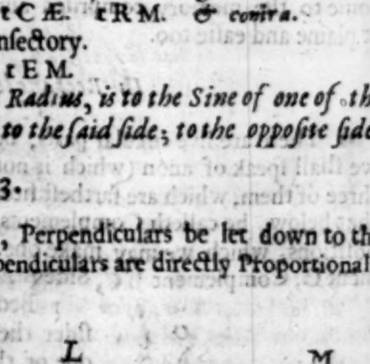
R. s ♈ M :: t ♈. t E M.

In any Sphærical Rectangle Triangle, *as the Radius, is to the Sine of one of the Sides, so is the Tangent of the angle adjacent to the said side, to the opposite side.*

PROP. 3.

If from two angles of a Sphæricall Triangle, Perpendiculars be let down to the opposite Sides, the Sines of the Angles and Perpendiculars are directly Proportionall: by the 1.

In the Triangle A B C, from the Poles L and M, draw the Perpendiculars C E and B D, upon C A and B A, continued to Quadrants.



Then by the Corolary of the first.

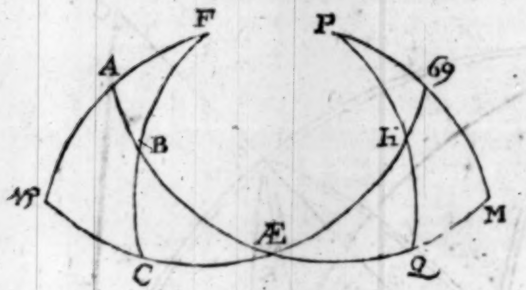
R. s C B :: s B. s C E.

And R. s C B :: s C. s B D.

Therefore by the 11. 5. s B : s C E :: s C. s B D

D PROP.

PROP. 4.

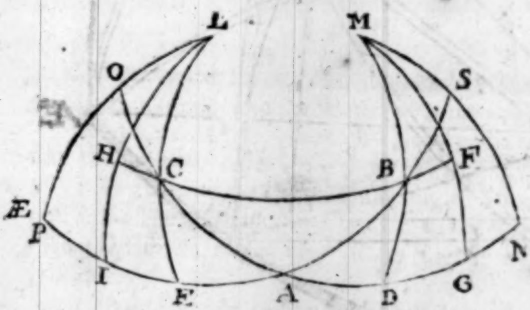


If two Perpendicular Arches subtend equall angles, the Sines of the Perpendiculars are Proportionall to the Sines of the Hypothenusaes, *& contra.*

Let B A C, be equall to H Æ Q, and the Perpendiculars B C and H Q drawn from the poles P and F.

s♋M. s♋Æ : : sHQ. sHÆ.
s A ♑. s A Æ : : s B C. s B Æ.
Therefor, sHQ. sHÆ :: sBC. sBÆ.

PROP. 5.



In any Sphæricall Triangle the Sines of the sides are Proportional to the Sines of their opposit angles.

In the oblique angled Triangle C B A, As the Sine of B, is to the Sine of C, So is the Sine of C A, to the Sine of B A, for.

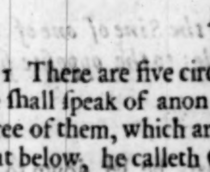
sHI. sFG : : sCE. sBD. p 3
And sCA. sBA :: sCE. sBD. p 4
Ergo, sHI. sCA : : sFG. sBA. or
sB. sCA :: sC. sBA.

CHAP. V.

These Demonstrations being premised, which are sufficient for our purpose since we doe follow that Method the tres-noble *Neper*, hath left us, which Master *Norwood* did strictly pursue, and *Wach* did touch upon: the whole Doctrine, whereof Dr. *Scarborough* hath made wonderfull easie and pleasant, whereby those tedious Demonstrations are avoided, and those Cases so burthensome to the memory comprised almost into one. I shall in one sheet or two make it plaine and easie too.

In Rectangle Sphæricall Triangles.

1 There are five circular parts, besides the right angle or Quadrantall side, which we shall speak of anon (which is not accounted amongst the circular parts) whereof three of them, which are farthest sited from the Right angle in this, or Quadrantall in that below, he calleth Complements, that he might fit them to two Universall Propositions, which we may make one. The parts are thus, Complement B, Complement C, Complement B C, Side B A, Side C A.



2 Because two termes are given to finde a third, consider these Termes according to their circular parts, and one of them will be middle part betwixt his extreames, known from the very position of the termes; if therefore this middle part be immediately conioyned with his extreames, call them extreames conioyned, as A C, C, B C, But if other parts, which come not into question, shall intervene & disioyn the said parts, let these parts be called extreames disiunct. As A C, B, C, here B is disioyned on both sides, by B C and B A. So is it in B C, B A, C A, where

where B C is middle part, C A and B A, extreames disiunct. And take notice, that B A and C A are conioyned, because the Right angle is not accounted amongst the circular parts.

2 Before we resolve this kinde of Triangle, discerne the middle part, and the extreames whether coniunct, or disiunct, if they be all united, the middle is the middle part coniunct, and the extreames, the extreame parts coniunct. If againe, anypart be disioyned, those parts considered are disioyned; that which stands by it selfe being segregated on either side is the middle part disioyned, and the extreames, extreame parts disioyned.

VNIVERSALL PROPOSITION.

The Sine of the middle part and Radius, are reciprocally Proportionall, with the Tangents of the Extreames conjunct, and with the Co-sines of the Extreams disjunct.

Namely, *As the Radius, to the Tangent of one of the extreames conjoyn'd, so is the Tangent of the other extream conjoyn'd, to the Sine of the middle part.* And also.

As the Radius, to the Co-sine of one of the Extreams dis-joyn'd, so the Co-sine of the other extreame dis-joyn'd, to the Sine of the middle part.

5 Therefore, *If the middle part be sought, the Radius is in the first place, if either of the extreames, the other extreame put in the first place.*

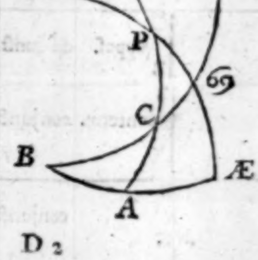
6 This Proposition is demonstrated by induction in all their Cases, and is coincident with them in the cases of extreames disiunct. In coniunct we differ thus, where they say, As the Radius to the Tangent, we say, as the Co-tangent to the Radius, *&* *inter se & contra*, which we made evident before.

Note, that when a Complement in the Proposition doth chance to concure with a Complement in the circular parts, you must take the sine it selfe, or the Tangent it selfe, because.

C S of the C S = S.
And, C T of the C T = T.

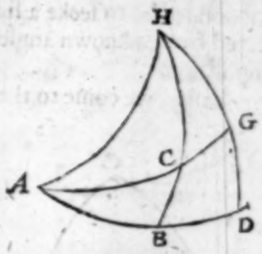
7 Here followes the Type of all the Varieties in the sixteen Cases.

Note that C A is the Cathetus, or Perpendicular, B A the Bases, B C the Hypothenusall, C the angle at the Cathetus, B the angle at the Base.



	Data.		Quæsita.		Analogia.	Demonstr.
	Sides	Augle	Sides	Angles		
1	BA BC: or CA		CA BA		BA csCA cs R :: csBC : CA csBA Extreams dis-junct.	By 1. Prop.
2	BC	B C	CA oppos. BA		sB: sCA: R: sBC :: sC: sBA: Extreams dis-junct.	By 5. Prop.
3		B: C	BA: or CA		sC: csB :: R: csCA: sB: csC :: csBA: Extreams dis-junct.	By 1. Prop.
4	BA conterm. CA	B C	CA oppos. BA	Extreams conjunct.	R: tB :: sBA: tCA: R: tC :: sCA: tBA: Fit it with the Proposition Universall it will be. ctB: R: &c.	By 2. Prop.
5	CA oppos. BA	B C	BA conter. CA	Extreams conjunct.	tB: tCA :: R: sBA: tC: tBA :: R: sCA: Suit it to the Cath. Propos. R: ctB :: &c.	By the fore going Case.
6	BC	B C	BA conter. CA	Extreams conjunct.	csB: tBA: R: tBC :: csC: tCA: By the Cathol. Proposition. ctBC: R :: &c.	By 2. Prop.
7		B: C	BC;	Extreams conjunct.	tB ctC: R :: csBC: tC ctB: By the Catho. Propositon. R: ctB :: &c.	By 2. Prop.
8	BA: CA		BC		R: csBA :: csCA: csBC: Extreams dis-junct.	By the 1. Case.
9	BA oppos. CA	C B	BC	Extreams dis-junct.	sB: sCA :: R: sBC: sC: sBA	By 5. Prop.
10	BA Conterm. CA	B C	BC	Extreams. conjunct.	ctBA csB: R: :: ctBC: ctCA csC: By the Cathol. Proposition. tBA: R :: &c.	By 1. Case.
11	BA conterm. CA	B C	C oppos. B	dis-junct.	sB csBA: csC: R: :: sC csCA: csB:	By 3. Case.
12	BA oppos. CA	C B	B conterm. C	dis junct.	csBA: csC sB: :: R: csCA: csB sC:	By the preceding.
13	BA: CA		B C	conjunct	sBA: tCA: sC: R:: sCA: tBA: sB: By the Cathol. Proposition. tCA: sBA :: R: ctB &c.	By the 5. Case
14	BA BC CA		C oppos. B	dis-junct.	sBA: sC: sBC: R :: sCA: sB:	By 5. Prop.
15	BA BC CA		B conterm. C	conjunct.	tBA: csB: tBC: R :: tCA: csC: Or R: ctBC: p. Cathol. &c.	By 6. Case.
16	BC	C B	B C	conjunct	C ctB: R: t :: csBC: B ctC: per Cath. ctC: R :: &c.	By 7. Case.

8 If you meet with a Quadrantall Triangle, the worke will be the same if you reduce it to a Rectangle, because there are 5 Circular parts, the three remotest whereof call Complements, as before. As in the Quadrantall H C A, H A is 90 degrees, and no Circular part here: Complement of C H, Complement of C, Complement of C A, A and H.



Take C B, the Complement of the Complement of H A B, measure of H, G A D, Complement of H AC A C B Complement of the Complement of H C A.

CHAP. VI.

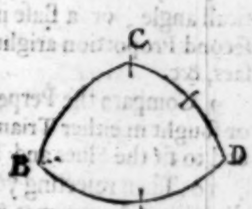
In Oblique Angled Sphericall Triangles.

1 If the *Data*, and *Quæsita* be opposed, they are to be resolved (by the 5 Prop.) when an angle is sought.

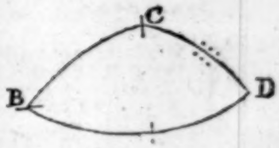
sBD: sB :: sCD: sB.

Or, *è converso*, when a Side is sought.

sC: sBD :: sB: sCD.



2 There are 10 other Cases, which must be resolved by the aid of two Analogies at the least, & that by reducing of the Obliqe into two Rectangles; by the demissionof a Perpendicular, So that we must handle methodically, first some Considerations about drawing the Perpendicular, which must divide the Triangle into two.

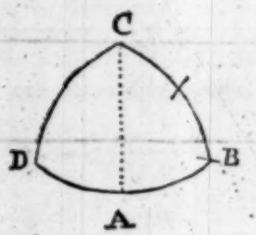


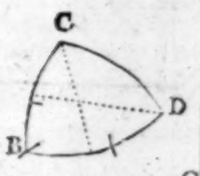
Secondly, what must be found out in the first Operation; and lastly, how to resolve the Question by the second Operation.

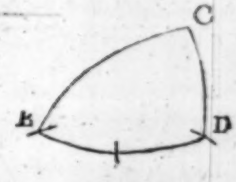
3 We may give a generall Rule in the letting fall the Perpendicular, *viz.* that it be so modificated, that we may resolve the Question by two Operations only.

But to do it readily, take this precept.

4 Draw the Perpendicular from the Extremity of the given side, in whose other Extremity there is a given angle, or adjacent. As C A from C, subtending the adjacent angle B. This Canon admits of a limitation in two Cases, *viz.* when two angles with a side comprehended are given, to find another side; or secondly, when two sides and an angle comprehended are given, to finde any other angle, in the first, of these Cases, let the Perpendicular be drawn from the extremity of the given side, to subtend the given angle; in the latter to be drawn as before, and to subtend the angle required.





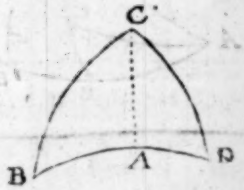


5 This being duely drawn, proceed then unto the first Analogie, which is always to be performed in that Rectangle partiall Triangle, where two things are known, besides the Right angle, and therein you must search out either a verticall angle or a Base.

 6 If

6 If the Question propounded be to find an angle, let the verticall angle be first sought, unlesse the Perpendicular be drawn to a known Side. But if the Question propounded be to seeke a sid, first finde a Base, unlesse the Perpendicular be protracted from a known angle: in either exception seeke the contrary by the Catholike Proposition.

7 Lastly, we come to the second Analogie, which consisteth in the comparison of two Homogeneall terms in each Triangle, with the verticall angles, or the Bases, for they are proportionall in this, and likewise in all the other cases.



As in the Triangle B C D, reduced to two Rectangles, I say that in the Sines and Tangents of the circular Parts, it shall be, as A B : B :: A D : D, &c. for by the Catholike Proposition.

In A B C } t A C. R. :: s A B. ct. B.
In A D C } t A C. R. :: s A D. ct. D.

Therefore (by the 11 of the 5 Elem.)

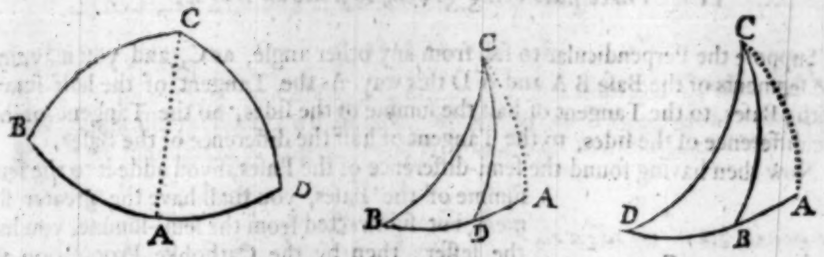
s A B : ct. B :: s A D : ct. D

8 So you see that having found according to the condition of the Question, a verticall angle, or a Base in the first operation, you must next procede to order your second Proportion aright amongst the homogeneall termes, as Bases, or Hypothenusaes, &c.

9 Compare the Perpendicular with each homogeneall term, whether it be given or sought in either Triangle, to distinguish betwixt the middle part and the Extream, and to fit the Sines and Tangents to them accordingly.

10 Then rejecting your Perpendicular and Radius in each comparison: the middle part and extreames of the one Triangle, shall be proportionall to the middle and extreames in the other, as it is illustrated in these 8 Cases.

Data



	Data. Side	Data. Angle	Quæsita. Side	Quæsita. Angle	Analogia prima	Analogia secunda & Demonstration
1	BC DC	oppos. B		Includ. C	ctB : R :: csBC : ctC. Note if the Perpendicular fall within BCA + CAD = BCD. If without. DCA – BCA, or BCA – DCA = BCD.	R. tCA :: ct BC. csC. R. tCA :: ctCD csACD *Ergò*, ct BC : cs BCA :: ct CD : ct ACD then BCA + ACD (1a.) & BCA – ACD (2a.) but DCA – BCA (3a.) = C.
2	BC CD	op. B	BD: 3. side Note againe.		ctBC. R :: csB : t. BA. BA + AD in 1a. BA – DA 2a. DA – BA 3a. = DB	csCA. R. { csBC. csBA csCD. csAD *Ergò*, csBC. csBA :: csCD csAD.
3	BC BD	Includ. B	D oppos.		ct BC. R :: cs B. tBA.	sBA. ctB t CA. R :: s AD. ctD. *Ergò*, s BA. ctB :: s AD. ctD.
4	BC BD	Includ. B	DC		ct BC. R :: cs B. t BA.	csBA. csBC. R. csCA :: csAD. csCD *Ergò*, csBA. cs BC :: csDA. csDC.
5	BC	B D	BD includ.		ctBC. R :: cs B. tBA. Observe the former caution whether the Perpend. fall within or without, whereby you may know whether to take the Summe or difference as the figures will direct you above.	B BA R. tCA :: ct s D AD. *Ergò*, ct B. sBA :: ctD. sAD.
6	BC oppos	B D		C	ctB. R :: ctBC. ct CA.	csB. sBCA. cs CA. R. csD. sACD. *Ergo*, csB. sBCA :: csD. sACD.
7	B and C and includ. BC		find DC op.		find BCA. ctB. R :: cs BC. ctBCA.	csACB. ctBC tAC. R. :: csACD. ctDC. *Ergo*, csACB. ct BC :: cs ACD. ct DC
8	B and C and includ. BC.		D		find BCA. ctB. R :: csBC. ctBCA.	sACB : csB. R. csCA :: sACD : csD. *Ergo*, sACB. csB :: sACD. csD.

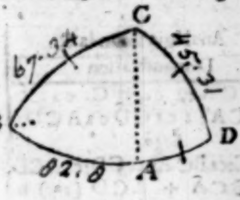
11 *Three*

11 *Three sides being given, to finde an Angle.*

Suppose the Perpendicular to fall from any other angle, as C, and you may finde the segments of the Base B A and A D this way. As the Tangent of the half summe of the Bases, to the Tangent of half the summe of the sides, So the Tangent of half the difference of the sides, to the Tangent of half the difference of the Bases.

Now then having found the semi-difference of the Bases, if you adde it to the semi-summe of the Bases, you shall have the greater segment, but substracted from the semi-summe, you have the lesser, then by the Catholike Proposition you may find the Angle desired.

T ½ Base : T ½ S. Sides :: T ½ X Sides : T ½ X Seg.



Note, if the Perpendicular fall without, then the semi-summe will be the semi-difference, *& contra.*

Illustration in Numbers.

In the Triangle B C D, the side B C is 67^d 34′, the side C D 45^d 31′, and the Base B D 82^d 8′, therefore the half summe of the Bases is 41^d 4′ 0″, the half summe of the sides 56^d 32′ 30″ and the half difference of the sides 11^d 1′ 30″. Hence,

BC = 67.34
CD = 45.31
S 113.05
½ S 56.32.30
X 22.03
½ X 11.01.30

As the Tangent of 41^d 4′ 0″,	9,940183
To the Tangent of 56^d 32′ 30″,	10,179903
So the Tangent of 11^d 1′ 30″,	9,289662
	19,469565
To the Tangent ½ dif. of the Bases 18^d 41′ 38″.	9,529382

Base. 82.8
41.4

Semi-summe of the Base	41^d 4′ 0″.	The greater segment A B 59^d 45′ 38″.
Semi-difference of the Base	18 41 38.	The lesser segment A D 22 22 22.

Then by the Cathol. Proposition	Tangent of B C 67^d 34′.	10,384207
	Radius 90^d.	10,000000
	Tangent of A B 59^d 45′ 38″.	10,234379
	Co-sine of the Angle B 44^d 54′ 34″.	9,850172

But because I have followed in the ensuing Treatise another kind of Resolution, I shall give you that, whose Demonstrat. you may find in Mr. *Gelibrands* Trigonometry.

Sine of B D 82^d 8′.		9,995893	I Summe	19,961717
Sine of B C 67 34.		9,965824	II Quadrat of the Rad.	20,000000
Dif.	14 34.			

C D	45′ 31′ ″		
Difference of B C and B D	14 34		
Summe	60 5		
Dif.	30 57		
Semi-summe	30 2 30		9,699516
Semi-difference	15 28 30		9,426215
		III Summe	19,125731

I Summe	19,961717
II Quadrat of the Radius	20,000000
III Summe	19,125731
IIII Quadrat of the Sine of ½ the angle sought	19,164014
Which bi-sected giveth 22^d 27′ 17″.	9,582007

whose Double is the Angle B. 44 54 34. As before.

12. If three Angles be given to find a side, you must make permutation of the angles into sides, and then it will co-incidere with the precedent Case.

The End of *Trigonometry*.

CHAP.

CHAP. VII.

FOr the using of the Canon, and ease of Multiplication and Division of Astronomicall Fractions, I will borrow Mr. *Oughtreds* Table *Pag.* 1. which is the very foundation of Logarith. and Astronomicall Arithmetick.

5	4	3	2	1	0	$\bar{1}$	$\bar{2}$	$\bar{3}$	$\bar{4}$	$\bar{5}$	
1	1	1	1	1	1	1	1	1	1	1	o Index of all numbers under 10.
0	0	0	0	0		0	0	0	0	0	
0	0	0	0				0	0	0	0	1 Index of all under 100, &c.
0	0	0						0	0	0	
0	0								0	0	
0										0	

I need not explaine it, since he hath done that, and many others, so amply and so learnedly already.

But to those that have not seene it, observe that the upper numbers are all in Arithmeticall proportion, and do descend 5. 4. 3. 2, &c. The lower are in Geometricall Progression, whether you begin as they encrease, from the right to the left, or decrease from the left to the right, in decuple Progression. This being the groundwork of Logarithmes, as he hath in another place demonstrated, where Addition and Substraction in that upper, which are Indices or Logarithmes, do answer to Division and Multiplication in the inferiour, *viz.* $3 + 2 =$, $1000 \times 100 = 100000$, &c.

To adde Logarith. or artificiall numbers, is the same with Multiplication of naturall, or true numbers. If the Logarithmes be of the same kind, *viz.* all affirmative, or above o, or all negative, that is lesse then o, the Aggregate must be of the same kind, As 4 to $2 = 6$. h: e: $10000 \times 100 = 1000000$. $\bar{4} + \bar{2} = \bar{6}$ or h.e: $\underline{|00001} \times \underline{|01} = \underline{|000001}$.

But if they be of divers kindes, then one will be in nature Substractive, and then take the difference of the Logarithmes of the factors for the Logarithme of the fact, prefixing the affection of the greater Logarithme, as $3 + \bar{2} = 1$ but $\bar{3} + 2 = \bar{1}$

In Substraction of Logarithmes, or division of true numbers, if they be homogeneall, i. e. of the same kinde, take their difference for the Logarithmes of the Quotient, which difference must be of the same kinde with the numbers given, as $4 - 2 = 2$ or $\bar{4} - \bar{2} = \bar{2}$. But if they be divers, adde their Logarithmes, the summe shall be the Logarithme of the Quotient, which must be affected as the greater Log. whether it be subducend, or *numerus è quo*.

$$\begin{array}{llcll} \text{So out of} & 0 + 3 & & & 0 - \bar{3} \\ \text{take} & 0 - \bar{2} & & \text{but} & 0 + 2 \\ \hline \text{dif.} & \quad 5 & & \text{dif.} & \quad \bar{5} \end{array}$$

To square or Cube any Number $1 \times 2 = 2$ Logarith. of the Quadrate. Also $1 \times 3 = 3$ Logarith. of the Cube, &c. and therefore to extract a Root $\frac{2}{2} = 1$ the Log. of the quadrate side, also $\frac{3}{3} = 1$ the Cubick side &c.

In Multiplication of Astronomicall Fractions, o is the note of Degr. all above it is the note of *Sexagena's* as 1 the note of *Sexagena prima*, 2 the note of *Sexagena secunda*, 3 the note of *Sexagena tertia, &c.* $\bar{1}$ the note of *Sexagesima prima, &c.*

To multiply therefore, is onely to adde the Indices, to divide, to substract the Indices, &c. and you shall have the species resulting, in either an Example will suffice.

Eexample of Multiplication.						
		0	$\bar{1}$	$\bar{2}$	$\bar{3}$	$\bar{4}$
		17°.	24′	10″.	‴	⁗.
		10	11	3		
				52	12	30
		3	11	25	50	
	2	54	1	40		
	1	0	$\bar{1}$	$\bar{2}$	$\bar{3}$	$\bar{4}$
	2	57	13	58	2	30

Example of Division.

```
      '    °    '    "    '"   ""
      2   57   13   58    2   30
          10   11    3
    ---------------------------
    2  53    7   51            (17°. 34'. 10".
    ---------------------------
         4    6    7    2   50.
              10   11    3
         4    4   25   12
              1   41   50   30.
                  10   11    3
             <1   41   50   30.
```

In the Calculation of the motions of the Planets, it often times happeneth that the Anomalie of the Excentrique consists not alwayes of even Signes and Degrees, but for the most part, hath min. and seconds annexed, therfore, that the Æquation in the Tables may readily be found, we are to seeke the Proportionall part by the Sexagenarie Table.

For as one Deg. or 60', to the Variation, or Difference of Æquations answering thereto, So is the minutes and seconds abounding, or exceeding the Degree of the Anomalie, to the Proportion of the Æquation sought for.

Suppose the Anomalie of ♂ be 1s. 10d. 15' 25". and his Equation be required.

Operation.

The Anomalie of ♂ { 1s. 10d. / 1 11. } Equations { 6d. 13'. 12". / 6 21 14 }

The Difference of Equations is 8. 2.

Then I say, If one degree or 60'. give 8'. 2". what shall 15'. 25". give?

The Resolution.

```
        15'.  25".
         8     2
         0    50
    0   30
    3   20
    2    0
    2    3   50   50.  The Proport. Part required.
```

Equation answering to 1s. 10d. is 6d. 13'. 12".

Part Proport. Adde, 2 3 51.

Equation æquated to 1s. 10'. 15' 25". is 6 51. 51 51.

In the Canon of artificiall Sines and Tangents.

Supose the Tangent given be 9619789, and it is required to finde the Arch corresponding thereunto. The next lesser is 9619720

Next greater 9620076

The Worke { 9619789 } 69 / 9619720 / { 9620076 } 356 | 356. 69. :: 60". 12". Therefore the Arch sought is 22d. 37'. 12". Then to find the Tangent of 22d. 37'. 12".

Arches { 22d. 37' ― ― ― ― 9619720 / 22 38 ― ― ― ― 9620076 } Difference 356 ad 60'.

60". 12" :: 356. 70.

Ergò, 9619720 + 70 = t. 22d 37' 12".

In the Chiliads.

The Number given is 953290. and the Logarithme thereof is required.

Numbers { 9532.00 / 9533.00 } Logarith. { 979184 / 979229 } Dif. 45 ad 100.

100. 45. :: 90. 40 1/2.

Ergò, to Log. 979184

Adde 40 1/2

Log. answering to the number given 5,979224 1/2 & *vice versa.*

And here you must note, that the first figure towards the left hand is the Caracteristique, which we account 0, or nothing, when the number given is under 10, then from 10 to a 100 it is accounted 1, from 100 to 1000, 2, from 1000 to 10000, 3 from 10000 to 100000 4, and so on, whereby you may perceive its easie to discerne the Chaistique of any number.

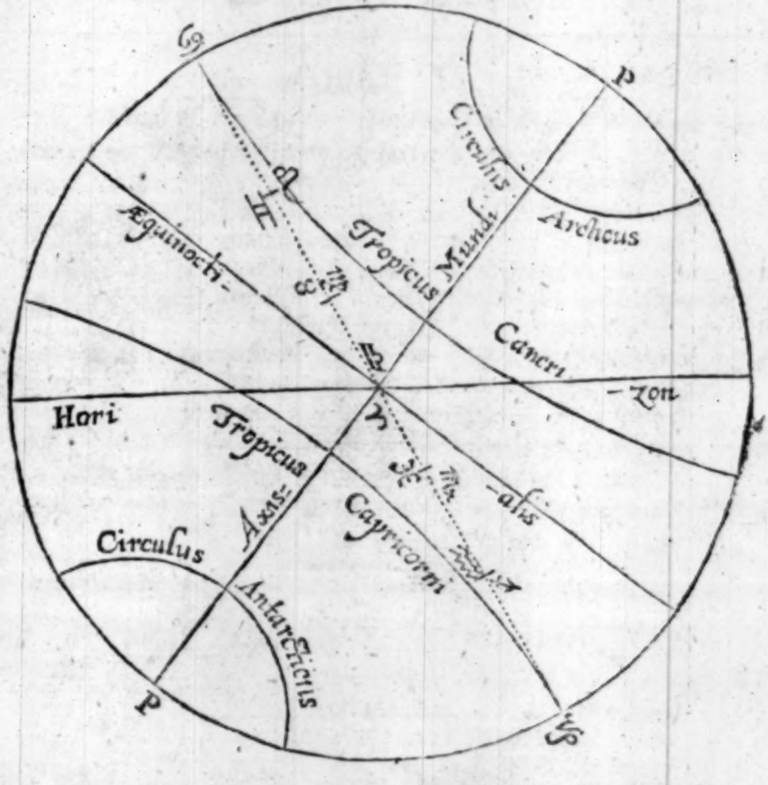
THE END OF THE FIRST PART.

HARMONICON COELESTE:

THE SECOND BOOK.

Containing ſundry Propoſitions Aſtronomicall, appertaining to the Firſt Motions, Being all of extraordinary uſe, Whereof few of them have been, as yet, treated of in the ENGLISH TONGUE.

Sphæra Materialis.



Fælices animæ, quibus hæc cognoſcere primum,
Inq; domos ſuperas ſcandere cura fuit.

LONDON:
Printed by ROBERT LEYBOURN, for the Company of STATIONERS, 1651.

HARMONICON COELESTE:

The Second Book:

CHAP I.

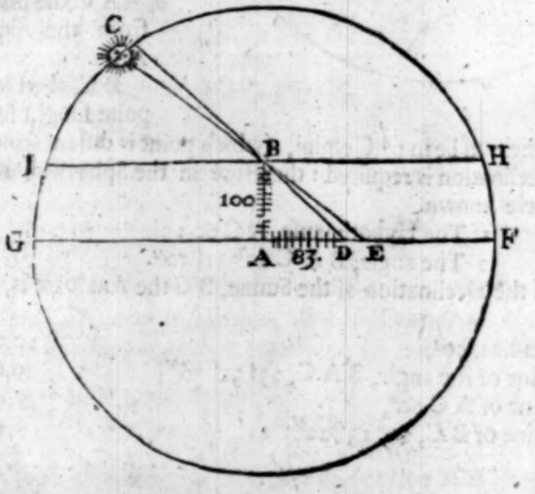
To finde the Altitude of the Sun above the Horizon at any time, by the shadow of a Gnomon or Staffe set perpendicularly.

IN the annexed Diagram. F A G, represents the Horizontall Plane. C, the place of the Sun. A B, a Staffe or Gnomon, erected perpendicular to the Horizon F A G, which casteth its shadow to the point D.

For illustration sake, let us suppose the length of the staffe A B, to be 100 parts, and the Longitude of the shadow thereof A D be 83, then in the Rectangle Triangle A B D, is known.

1 The side A B, 100 parts.
2 The side A D, 83 parts.

Therefore, to finde the angle C D G, or altitude of the upper edge othe Sun, I say,



As the Longitude of the Shadow, A D 83,	1,919078
To the Longitude of the Staffe, A B 100;	2,000000
So the Radius, 90 degrees,	10,000000
To the Tangent of the Angle, A D B 50d 18′ 26″:	10,080922

From

From which taking the Semidiameter of the Sun $16' 27''$, there remains $50^d 1' 59''$ the true Altitude of the Center of the Sunne.

After this manner, if you observe the greatest Meridian altitude of the Sunne, the 11 of Iune and 10 of December, you shall by the Difference of them finde the distance of the Tropicks, greatest Declination of the Sunne, Elevation of the Equator, and Latitude of the Place.

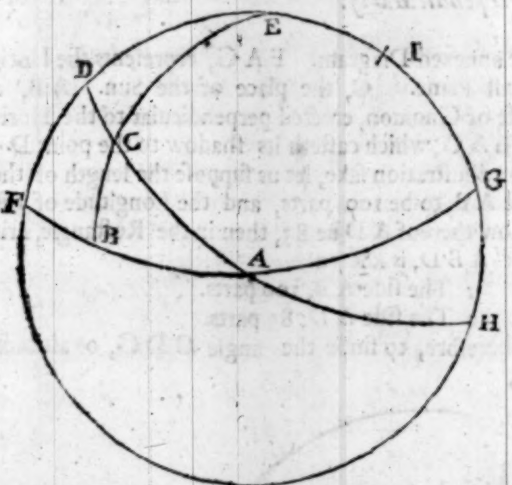
EXAMPLE.

At *London*, the greatest meridian Altitude of the Sun, is $61^d 59' 30''$, and the least $14^d 56' 30''$.

	D	′	″
The Suns greatest Meridian altitude taken Iune 11 is,	61	59	30
The Suns least Meridian altitude taken December 10,	14	56	30
Distance of the Tropicks,	47	3	0
Greatest Declination of the Sunne,	23	31	30
Elevation of the Æquator,	38	28	0
Altitude of the Pole.	51	32	0

CHAP. II.

The greatest Declination of the Sunne being given, to finde the Declination of any point of the Ecliptique.



IN this Figure.

DFHG, denotes the Solstitiall Colure.

F B A G, the Æquator.

D A H, the Ecliptique.

I, the Pole of the Ecliptique.

E, the Pole of the Æquator.

C E B, a Meridian line passing from E through the Sun at C, and falling upon the Æquator F A G, with right angles in the point B.

DAF, the angle of the Suns greatest Declination.

A C, the distance of the Sun from the Æquinoctiall point Aries.

B C, the Declination of the point sought for.

Now suppose the Sun be in 0^d Gemini, (which point is distant from the Equinoctiall 60^d) and his declination is required: therefore in the Sphæricall Rectangle Triangle, A B C, we have known.

1 The Hypothenuse, A C 60^d:

2 The angle, B A C $23^d 31' 30''$.

Then to find the Declination of the Sunne, B C the Analogie is,

As the Radius, 90^d,	10,000000
To the Sine of the angle, B A C, $23^d 31' 30''$;	9,601135
So the Sine of A C 60^d,	9,937530
To the Sine of B C, $20^d 13' 22''$:	9,538665

CHAP.

CHAP. III.

Having the greatest Declination of the Sunne, together with his Distance from the next Æquinoctiall point, to finde his Right Ascension.

IN the Triangle A B C of the former Diagram, having (as before) the angle B A C, and the Hypothenuse A C, the Right Ascension of the Sunne A B, will be found to be $57^{d}\ 48'\ 6''$. for,

As the Radius, 90^{d},	10,000000
To the Tangent of A C 60^{d};	10,238560
So the Co-sine of A, $23^{d}\ 31'\ 30''$,	9,962315
To the Tangent of A B, $57^{d}\ 48'\ 6''$:	10,200875

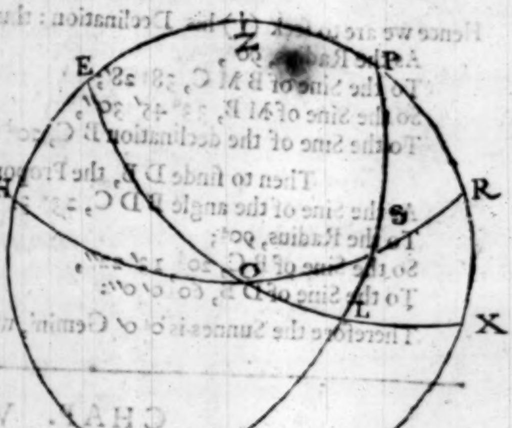
Or, as the Tangent of A $23^{d}\ 31'\ 30''$, to the Radius, So the Tangent of B C, $20^{d}\ 13'\ 22''$, to the Sine of A B, $57^{d}\ 48'\ 6''$

Or thus, As Co-sine of B C, to Radius, So Co-sine of A C, to Co-sine of A B.

CHAP. IV.

Having the Elevation of the Pole, and Declination of the Sun, to finde his Amplitude.

IN the annexed Scheme
EHKRP, is the Meridian.
H O R, the Horizon.
E O X, the Æquator.
P, the Pole of the Æquator.
L S, the Suns declination.
R O X, Complement of the Poles Elevation.
O S, the Sunns Amplitude required.



Admit the Sunne be in the first point of Gemini, as before: wherefore in the Triangle S O L, having the angle O, $38^{d}\ 28'$, and the side L S, $20^{d}\ 13'\ 22''$, we shall finde the Sunnes Amplitude O S, $33^{d}\ 45'\ 30''$. for,

As the Sine of the angle S O L, $38^{d}\ 28'$,	9,753831
To the Radius, 90^{d};	10,000000
So the Sine of L S $20^{d}\ 13'\ 22''$,	9,538665
To the Sine O S, $33^{d}\ 45'\ 39''$:	9,744834

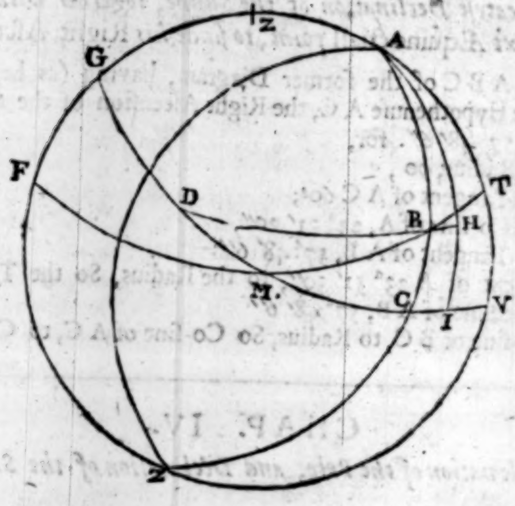
CHAP. V.

Having the Amplitude *of the Sunne, and Elevation of the Pole, to finde the Sunnes Declination, and consequently, his true place in the* Zodiaque.

IN the following Diagram, observe, that,
A G F A, is the Meridian.
F M T, the Horizon.
G D C M I V, the Æquator.
D B H, a part of the Zodiaque.
A, the Pole thereof,
D, the beginning of Aries.
H, the first point of Cancer.
H I, the greatest declination of the Sunne.
V T, the Complement of the Poles Elevation.
B C, the declination of the Sunne.
A H I, the Solstitiall Colure.
M B, the Sunnes Amplitude.
B, the Sunnes place.
D B, the Arch desired.

In

In the Rectangle Triangle B C M, is known:
1 The angle B M C $38^d\ 28'$.
2 The Hypothenuse B M $33^d\ 45''\ 30''$.



Hence we are to seek (1) his Declination: thus,

As the Radius, 90^d,	10,000000
To the Sine of B M C, $38^d\ 28'$;	9,793831
So the Sine of M B, $33^d\ 45'\ 30''$,	9,744834
To the Sine of the declination B C, $20^d\ 13'\ 22''$:	9,538665

Then to finde D B, the Proportion is,

As the Sine of the angle B D C, $23^d\ 31'\ 30''$,	9,601135
To the Radius, 90^d;	10,000000
So the Sine of B C, $20^d\ 13'\ 22''$,	9,538665
To the Sine of D B, $60^d\ 0'\ 0''$:	9,937530

Therefore the Sunnes is $0^d\ 0'$ Gemini, which was required.

CHAP. VI.

Having the Suns Amplitude *and Declination, to finde the height of the Pole.*

IN the Triangle B C M of the former Diagram, I say,

As the Sine of the Suns Amplitude B M, $33^d\ 45'\ 30''$,	9,744834
To the Sine of the Suns declination B C, $20^d\ 13'\ 22''$;	9,538665
So the Radius, 90^d,	10,000000
To the Sine of the angle, B M C, $38^d\ 28''$	9,793831

The Complement whereof $51^d\ 32'$, is the Elevation of the Pole desired.

CHAP. VII.

Having the Amplitude *and Declination of the Sun, to finde the Ascensionall Difference.*

IN the Triangle B M C of the last premised Diagramme, M B is the Amplitude, B C the Declination, and M C the Ascensionall difference, which is required.

As

As the Co-sine of the Suns declination B C $20^{d}\ 13'\ 22''$	9,972368
To the Radius, 90^{d}	10,000000
So the Co-sine of the Suns Amplitude M B $33^{d}\ 45'\ 30''$,	9,919804
To the Co-sine of the Ascensionall Difference M C $27^{d}\ 37'\ 28''$	9,947436

Or, having the Latitude of the Place, and Declination of the Sun, to finde the Ascensionall Difference.

As the Tang. of the Ang. CMB, the Compl. of the Poles Elevation, $38^{d}\ 28'$,	9,900086
To the Radius 90^{d};	10,000000
So the Tangent of B C, the Suns Declination $20^{d}\ 13'\ 22''$,	9,566295
To the Sine of M C the Ascensionall difference $27^{d}\ 37'\ 28''$:	9,666209

CHAP. VIII.

Having the Right Ascension *and* Ascensionall Difference, *to finde the* Oblique Ascension *and* Descension.

IN the former Diagram, D C represents the Right Ascension, M C the Ascensionall difference, and D M the Oblique Ascension, which is found by deducting the Ascensionall difference C M, from the Right Ascension D C. For,

If the Declination be	North	Substract	The Ascensionall difference, to or from the Right Ascension, and it will give	The Oblike	Ascensi.
		Adde			Descensi.
	South	Adde	The Ascensionall difference, to or from the Right Ascension, and it will give	The Oblike	Ascensi.
		Substract			Descensi.

	D	′	″
Right Ascension 0^{d} ♊	57	48	06
Ascensionall Difference	27	37	28
Oblique Ascension 0^{d} ♊	30	10	38
Oblique Descension 0^{d} ♊.	85	25	34

CHAP. IX.

To finde the time of the Suns rising, and setting, with the length of the Day and Night.

ACcording to the 7 Chap. aforegoing, finde the Ascensionall difference of the Sun, which, when the Sun is in the Northern Signes, is to be added to the Semi-diurnall Arch of the Right Sphære, which is 90^{d}. but is to be substracted from the same, if he be in the Southern Signes, and the Summe or difference will be the Semi-diurnall Arch, which doubled, is the Day Arch, whose Complement to 24 hours is the Night Arch, which bi-sected, is the time of the Sunns rising.

As when the Sun is in the first point of Gemini, his Ascensionall difference is found to be $27^{d}\ 37'\ 28''$, which I adde to the Quadrant, because his declination is North, and the Aggregate will be the Semidiurnall Arch.

	D	′	″
The Quadrant or Semid. Arch of the Right Sphære,	90	0	0
Ascensionall difference adde,	27	37	28
The Semidiurnall Arch,	117	37	28
The Diurnall Arch.	235	14	56

The Diurnall Arch converted into time maketh $15^h\ 41'\ 0''$, for the length of the Day, whose Complement to 24^{ho} *viz.* $8^{ho}\ 19'\ 0''$, is the length of the Night, which bi-sected giveth the time of the Sun rising at $4^h\ 9'\ 30''$.

CHAH. X.

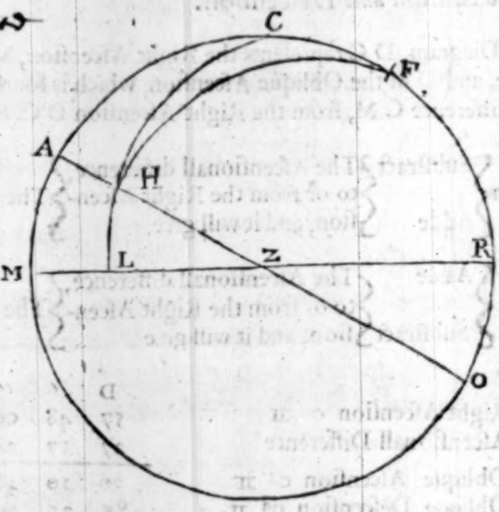
Having the Elevation of the Pole, and Declination of the Sun, to finde his Altitude at any time assigned.

In this Probleme, are three Varieteis,

1 IF the Sunne be in the Æquator, that is in the beginning of Aries or Libra.

In this Diagram annexed, suppose the Sun at H, be two houres distant from the Meridian A, or 30^d, and the Elevation of the Pole R F be $51^d\ 32'$ equall to A C, the angle at A, being right: therefore,

Note ye on houre distance of ye ☉ from ye meridian is 15 degrees & every 4 minuts is 1 degree



As the Radius, 90_d,	10,000000
To the Co-sine A H, 30_d;	9,937530
So the Co-sine A C, $51_d\ 32'$,	9,793832
To the Co-sine C H, $57^d\ 24'\ 13''$:	9,731362

Whose Complement $32^d\ 35'\ 47''$ is the side L H, which is the true altitude of the Sunne above the Horizon.

2 If the Sun be in the Northern Signes, ♈, ♉, ♊, ♋, ♌, ♍.

In the Diagram annexed.

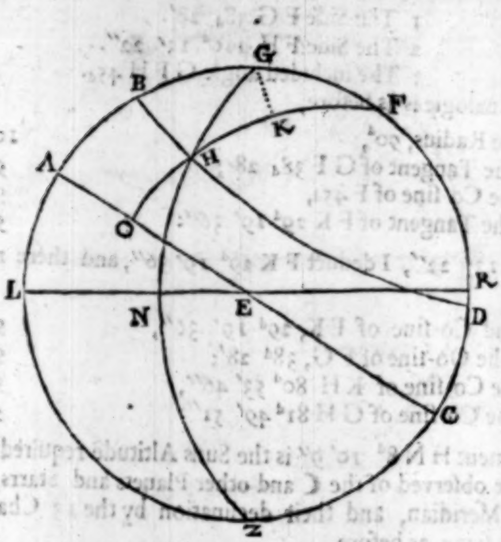
A E C represents the Æquinoctiall.
F, the Pole of the Æquinoctiall.
L E R, the Horizon.
G, the Pole of the Horizon.
B D, a parallel of the ☉ declination.

F O, the Meridian of the ☉.
B H, the distance of the ☉ from the Meridian.
H O, the declination of the ☉ North.
R F, the altitude of Pole.
F G, the Complement.

Admit the Sun at H, be distant from the Meridian B 45^d and be then in o Gemini, where his declination O H is $20^d\ 13'\ 22''$, which being taken out of the Quadrant F O, 90^d, there remains F H $69^d\ 46'\ 38''$, which known, we have in the Triangle F G H these three parts.

1 The side F G $38^d\ 28'\ 0''$.
2 The side F H 69 46 38.
3 The included angle G F H 45^d.

Then



Then I say,

1	As the Radius 90 deg.	10,000000
	To the Tangent F G, $38^d\ 28'$.	9,900086
	So the Co-sine of the angle F 45^d,	9,849485
	To the Tangent of F K, $29^d\ 19'\ 36''$.	9,749571

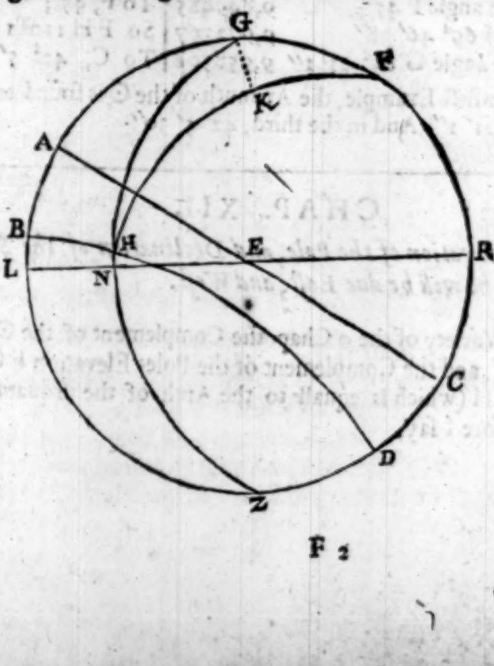
Then from F H $69^d\ 46'\ 38''$, I deduct FK $29^d\ 19'\ 36''$ and there remains K H $40^d\ 27'\ 2''$. then I say again.

2	As the Co-sine of F K $29^d\ 19'\ 36''$	9,940437
	To the Co-sine of F G $38^d\ 28'$	9,893745
	So the Co-sine of K H $40^d\ 27'\ 2''$	9,881365
	To the Co-sine of G H $46^d\ 53'\ 25''$.	9,834673

The Complement whereof N H $43^d\ 6'\ 35''$ is the altitude of the Sun above the Horizon.

3 If the Sun be in the Southern Signes ♎, ♏, ♐, ♑, ♒, ♓.

Suppose the Sun in the Winter season be in the opposite point to the former, *viz.* in o ♐, having on the contrary $20^d\ 13'\ 22''$ South Declination, and be also 45^d distant from the Meridian, as before, therefore in the Oblique angled Triangle F G H of the annexed Diagram we have given.



 1 The

1 The Side F G 38^d $28'$.
2 The Side F H, 110^d $13'$ $22''$.
3 The included angle G F H 45^d.

Then the Analogie is as before,

1	As the Radius, 90^d,	10,000000
	To the Tangent of G F 38^d $28'$;	9,900086
	So the Co-sine of F 45^d,	9,849485
	To the Tangent of F K 29^d $19'$ $36''$:	9,749571

From F H 110^d $13'$ $22''$, I deduct F K 29^d $19'$ $36''$, and there rests K H 80^d $53'$ $46''$. then.

2	As the Co-sine of F K, 29^d $19'$ $36''$,	9,940427
	To the Oo-sine of F G, 38^d $28'$;	9,893745
	So the Co-sine of K H 80^d $53'$ $46''$,	9,199275
	To the Co-sine of G H 81^d $49'$ $51''$:	9,152583

Whose complement H N 8^d $10'$ $9''$ is the Suns Altitude required.

The like is to be observed of the ☾ and other Planets and Starrs, for having their distance from the Meridian, and their declination by the 13 Chap. following, the Worke will be the same, as before.

CHAP. XI.

Having the Altitude of the Sun, his Distance from the Meridian, and Declination, to find his Azimuth.

Notey ordinary Distance of ye ☉ from ye meridian is 15 degrees

THe Azimuth, or Latitude of the ☉ from the Meridian, is an Arch of the Horizon intercepted between the Meridian, and the verticall line passing by the ☉, being understood in the former Schemes by the angle L G N, or Arch L N.

In the first Diagram of the last Chap. I say,

As the Sine of C H 57^d $24'$ $13''$,	9,925563
To the Sine of the angle F 30^d;	9,698970
So the Sine of F H 90^d,	10,000000
To the Sine of the angle C 36^d $24'$ $17''$:	9,773407

In the second Diagram.		In the third Diagram.	
As the Sine of G H 46^d $53'$ $25''$,	9,863350	As G H 81^d $49'$ $51''$.	9,995570
To the Sine of the angle F 45^d;	9,849485	To F, 45^d;	9,849485
So the Sine of F H 69^d $46'$ $38''$	9,972367	So F H 110^d $13'$ $22''$	9,972367
To the Sine of the angle G 65^d $21'$ $1''$	9,958502	To C, 42^d $5'$ $30''$	9,826282

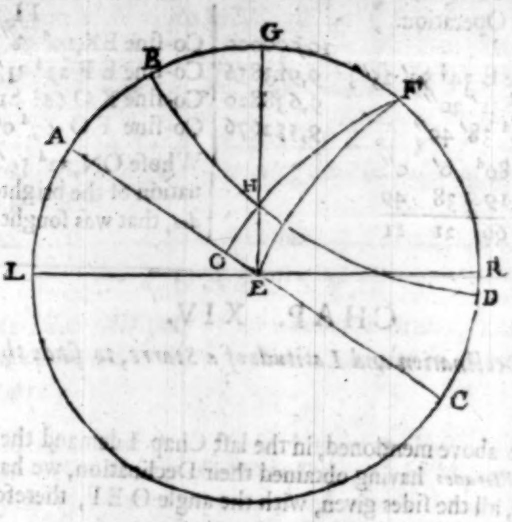
Therefore in the first Example, the Azimuth of the ☉ is found to be 36^d $24'$ $17''$. In the second, 65^d $21'$ $1''$. And in the third, 42^d $5'$ $30''$.

CHAP. XII.

Having the Elevation of the Pole, and Declination of the Sun, to finde the time when he will be due East, and West.

IN the second Variety of the 9 Chap. the Complement of the ☉ Declination F H is 69^d $46'$ $38''$, and the Complement of the Poles Elevation F G 38^d $28'$. Hence, the angle G F H (which is equall to the Arch of the Equator A O) is to be sought, therefore I say,

As



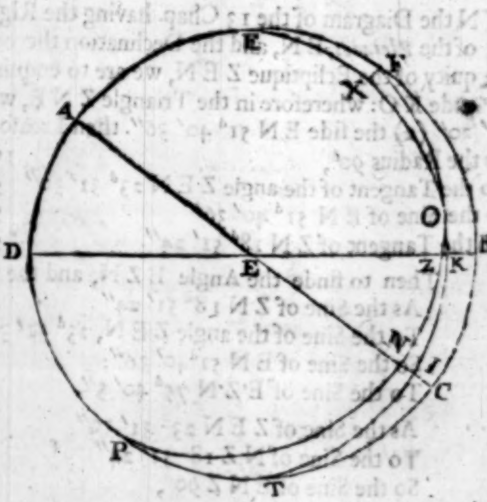
As the Tangent of F H, 69d 46′ 38″, 10,433704
To the Radius, 90d; 10,000000
So the Tangent of F G, 38d 28′, 9,900086
To the Co-sine of the angle F, 72d 58′ 56″: 9,466382

Whose Complement O F E 17d 1′ 4″ being converted into time, giveth 1h 8′ 4″, and so long is it after 6 in the morning when the ☉ will be due East, and before 6 at night, when he will be due West.

CHAP. XIII.

Having the Longitude and Latitude of a Starre, to finde its Declination.

IN the adjunct Scheme, let E B T D, represent the Solstitiall Colures.
A E C, the Æquator.
D E B, the Signifier.
F and P, the Poles of the Æquator.
E and T, the Poles of the Signifier.
O, the Place of the Starre.
E K, the Longitude.
K O, the Latitude.
O N, the Declination,



The first of Ianuarie this Year 1650. the Declination of the *Pleiades* is required, at which time the Longitude of the middle and brightest of them is 25d 5′ 35″ Taurus, and the Latitude 4d North, the Declination of the Sun being fixed *viz.* 23d 31′ 30″, wherefore, by the intersection of three great Circles, we have limited the Oblique angled Triangle E F O, wherein is given:

1 The side F F, the Suns greatest Oliquity 23d 31′ 30″
2 The side E O, the Complement of their Latitude North 86d.
3 The ang. F E O, the Complement of their Longitude to the Quadrant 34d 54′ 25″

I. The Operation.

Radius 90^d	10,000000
Co-sine of the angle E $34^d\ 54'\ 25''$;	9,913856
Tangent of E F $23^d\ 31'\ 30''$	9,638820
Tangent of E X $19^d\ 38'\ 49''$	9,552676

From	E O	86^d	$0'$	$0''$
Substr.	E X	19	38	49
Rests	X O	66	21	11

II

Co-sine EX, $19^d\ 38'\ 49''$	9,973950
Co-sine E F $23^d\ 31'\ 30''$	9,962315
Co-sine X O $66^d\ 21'\ 11''$	9,603252
Co-sine F O $67^d\ 0'\ 52''$	9,591617

Whose ON, $22^d\ 59'\ 8''$ is the Declination of the brightest of the *Pleiades*, that was sought for.

CHAP. XIV.

Having the Declination and Latitude of a Starre, to finde the Right Ascension.

AT the time above mentioned, in the last Chap. I demand the Right Ascension of the *Pleiades*, having obtained their Declination, we have in the Triangle E F O, all the sides given, with the angle O E F, therefore to finde the angle F, the Analogie is,

As the Sine of F O $67^d\ 0'\ 52''$	9,964072
To the Sine of of the angle E $34^d\ 54'\ 28''$;	9,757591
So the Sine of E O $86^d\ 0'$	9,998941
To the Sine of the Compl. of the ang. F, $38^d\ 19'\ 24''$.	9,792460

Which angle F $38^d\ 19'\ 24''$ is equall to the arch C N, whose Complement E N $51^d\ 40'\ 36''$ is the Right Ascension of the middle and brightest Starre of the *Pleiades*.

CHAP. XV.

Having the Declination and Right Ascension of a Starre, to finde the Longitude and Latitude thereof.

IN the Diagram of the 13 Chap. having the Right Ascension of the bright Sarre of the *Pleiades*, E N, and the Declination thereof N O, with the greatest Obliquity of the Ecliptique Z E N, we are to enquire its Longitude E K, and Latitude K O: wherefore in the Triangle Z N E, we have (1) the angle Z E N 23^d $31'\ 30''$ (2) the side E N $51^d\ 40'\ 36''$. then I reason,

As the Radius 90^d,	10,000000
To the Tangent of the angle Z E N $23^d\ 31'\ 30''$	9,638820
So the Sine of E N $51^d\ 40'\ 36''$	9,894607
To the Tangent of Z N $18^d\ 51'\ 24''$.	9,533427

From Declination			
No.	22^d	$59'$	$8''$
Taking N. Z	18	51	24
Reste Z O	4	7	44

Then to finde the Angle E Z N, and the side E Z, the Analogie is,

As the Sine of Z N $18^d\ 51'\ 24''$	9,509473
To the Sine of the angle Z E N, $23^d\ 31'\ 30''$;	9,601135
So the Sine of E N $51^d 40'\ 36''$;	9,894607
To the Sine of E Z N $75^d\ 40'\ 5''$.	9,986269
As the Sine of Z E N $23^d\ 31'\ 30''$	9,601135
To the Sine of N Z $18^d\ 51'\ 24''$	9,509473
So the Sine of E N Z 90^d,	10,000000
To E Z $54^d\ 4'\ 9''$.	9,908338

Which angle E Z N is equall to the angle O Z K.

Then to finde the Latitude O K, I say,

As the Sine of O K Z 90^d,	10,000000
To the Sine of Z O $4^d\ 7'\ 44''$	8,857334
So the Sine of O Z K $75^d\ 40'\ 5''$,	9,986269
To the Sine of the Latitude O K $4^d\ 0'\ 0''$	8,843603

Lastly,

Lastly, to finde the Arch Z K, and consequently, the Longitude E K.

As the Tangent of the angle K Z O 75ᵈ 40′ 5″,	10,592625
To the Radius 90ᵈ;	10,000000
So the Tangent O K 4ᵈ 0′,	8,844644
To the Sine of Z K 1ᵈ 1′ 26″:	8,252019

Which being added to E Z 54ᵈ 4′ 9″, giveth E K 55ᵈ 5′ 35″, which is the true Longitude of the middle and brightest Starre of the *Pleiades* from the Vernall Æquinox E, at the time given.

CHAP. XVI.

Having the Meridian Altitude of an unknown Starre, and the Distance thereof from a known Starre, to finde the Longitude and Latitude of the unknown Starre.

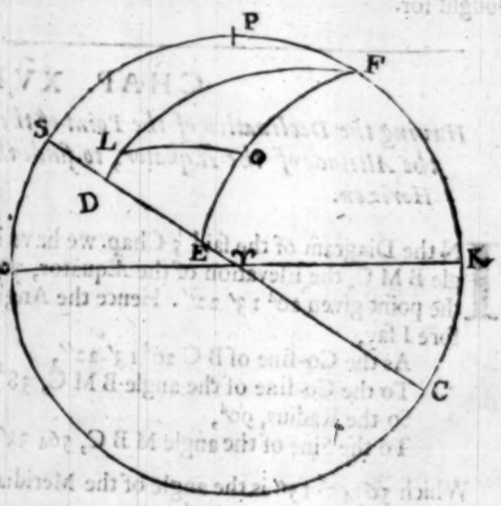
ABout the end of the Year 1577. *Tycho* observed the Distance of the little Star, in the Breast of *Pegasus* from the bright Starre of the *Vultur* to be exactly 45ᵈ 31′, and by the Meridian altitude thereof, he found the Declination to be 22ᵈ 26′ North, which given, the Longitude of the said Starre is to be enquired, therefore in the Oblique angled Triangle (of the annexed Diagram) F O L is known.

1 F L the Complement of the declination of the bright ✱ of the *Vultur* 82ᵈ 8′.

2 F O, the Complement of the declination of the ✱ in the breast of *Pegasus* 67ᵈ 34′

3 O L, the distance of them 45ᵈ 31′.

Hence, the angle at F (which is the difference of their Right Ascensions) will be found to be 44ᵈ 54′ 33″, as I shall here demonstrate.



Sine of F L 82, 8′		9,995893
Sine of F O 67 34		9,965824
Difference 14 34		
I Summe		19,961717
II Quadrat of the R.		20,000000
Base L O	45ᵈ 31′	
Difference of F L and F O	14 34	
Summe	60 5	
Difference	30 57	
½ of the Summe	30 2 30	9,699516
½ of the Difference	15 28 30	9,426215
III Summe		19,125731
I Summe		19,961717
II Qadrat of the Radius		20,000000
III Summe.		19,125731
IIII Quadrat of the Sine of half the angle sought		19,164014
Which Bi-sected, giveth 22ᵈ 27′ 17″.		9,582007

Whose double 44ᵈ 54′ 34″ is the angle L F O, which is equall to the Arch D E, the difference of their Right Ascensions, which Arch I adde to the Right Ascension of the bright ✱ of the Vultur 292ᵈ 35′ and the Summe 337ᵈ 29′ 34″ is the Right Ascension of the little Starre in the brest of *Pegasus*.

Then

Then having the Declination of this Starre 22^d 26′ North, and the Right Ascension 337^d 29′ 34″ the Longitude of the said Starre, by the 15 Chap. will be found to be 18^d 36′ ♓, and the Latitude thereof 29^d 24′ North.

CHAP. XVII.

Having the greatest Obliquity of the Ecliptique, together with the distance of the point given from the Æquinoctiall, to finde the Angle of the Intersection of the Ecliptique with the Meridian.

IN the Diagramme of the 5 Chap. we have known in the Triangle D C B.
1 The angle D, the greatest Declination of the ☉ 23^d 31′ 30″.
2 D B, the Distance of ☉ from the beginning of ♈. *viz.* 60^d 0′.
3 The Angle C 90^d.

Then the Analogie is,

As the Radius 90^d,	10,000000
To the Tangent of the angle B D C 23^d 31′ 30″;	9,638820
So the Co-sine of D B 60^d,	9,698970
To the Co-tangent of the angle D B C 77^d 43′ 13″.	9,337790

Which 77^d 43′ 13″ is the angle of the Ecliptique with the Meridian, that was sought for.

CHAP. XVIII.

Having the Declination of the Point of the Ecliptique given, together with the Altitude of the Æquator, to finde the angle of the Meridian, with the Horizon.

IN the Diagram of the said 5 Chap. we have in the Triangle B C M, (1) the angle B M C, the Elevation of the Æquator, 38^d 28′ (2) B C the Declination of the point given 20^d 13′ 22″. Hence the Angle M B C is to be enquired. Therefore I say,

As the Co-sine of B C 20^d 13′ 22″,	9,972367
To the Co-sine of the angle B M C, 38^d 28′;	9,893745
So the Radius, 90^d,	10,000000
To the Sine of the angle M B C, 56d 33′ 15″.	9,921378

Which 563d 3′ 15″ is the angle of the Meridian (or Circle of Declination) with the Horizon, that was required.

CHAP. XIX.

To finde the angle Orient, or Altitude of the 90^d of the Ecliptique, and consequently the Points ascending and descending.

FIrst, we are to enquire what Signe and degree is in the *Medium Cœli*. Admit the Sun be in 0 ♊, distant from the Meridian 3^{ho} or 45d *Ad Ortum*.

	D	′	″
Right Ascension ☉ in 0 ♊ by the 3 Chap.	57	48	6
Distance of the ☉ from the Meridian, Substract.	45	0	0
Right Ascension of the *Medium Cœli.*	12	48	6

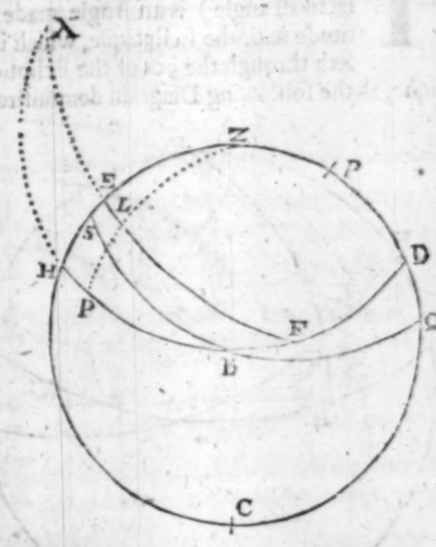
Hence, the Point culminating is 13d 55′ 8″ Aries, for in the Diagram of the 5 Chap. in the Triangle B C D, I say,

As

As the Radius, 90d, 10,000000
To the Co-tangent D C, 12d 48′ 6″; 10,643544
So the Co-sine of the angle B D C, 22d 31′ 30″, 9,962315
To the Co-tangent of D B 13d 55′ 8″: 10,605859

That is the 13d 55′ 8″ Aries, which is the Point Culminating, the Declination whereof, according to the 2 Chap is 5d 30′ 35″ North, which taken out of the Elevation of the Pole 51 32′, leaveth 46d 1′ 25″, which is the distance of the Point culminating from the Zenith, then according to the 17 Chap. the angle of the point culminating with the Meridian is found to be 67d 5′ 37″.

Then, in the annexed Diagram, observe that Z H C D Z represents the Meridian.
S B Q, the Æquator.
P, the Pole of the Æquator.
H B D, the Horizon.
Z, the Zenith, or Pole of the Horizon.
E, the Point Culminating.
L P, the 90d or greatest altitude of the Ecliptique.
F E X, a Semi-circle of the Ecliptique.
F, the Point Ascending.
X, the Point descending.
P F L, the angle Orient.
P X L, the angle Occident.



These things premised, we have in the Right angled Triangle Z L E, (1) the side Z E, the distance of the Point Culminating from the Zenith 46 1′ 25″ (2) the angle Z E L, the angle of the Point Culminating with the Meridian, 67d 5′ 37″. Hence the side Z L is required. therefore,

As the Radius, 90d, 10,000000
To the Sine of the angle Z E L, 67d 5′ 37″; 9,964227
So the Sine of Z E 46d 1′ 25″ 9,857107
To the Sine of Z L 41d 31′ 11″ 9,821434

Whose Complement P L 48d 28′ 49″, is the Altitude of the 90d or angle at F, or X.

Then in the Triangle, X E H, is known.
1 The angle X 48d 28′ 49″.
2 E H, 43d 58′ 35″.
3 The angle X H E, 90d.

Then to finde the side X E, the Analogie is,
As the Sine of the Angle E X H, 48d 28′ 49″, 9,874224
To the Sine of E H 43d 58′ 25″; 9,841585
So the Sine of the angle Z H E, 90d, 10,000000
To the Sine of X E, 68d 1′ 52″ 9,967261

The point of the Ecliptique culminating at E, is before found to be 13d 55′ 8″ ♈, from which deducting X E, 68d 1′ 52″ or two Signes 8 1′ 52″, there remaineth the point of the Ecliptique Descending at X, 5d 53′ 16″ ♒, whose opposite point 5d 53′ 16″ ♌, is the point of the Ecliptique Ascending at the same instant at F.

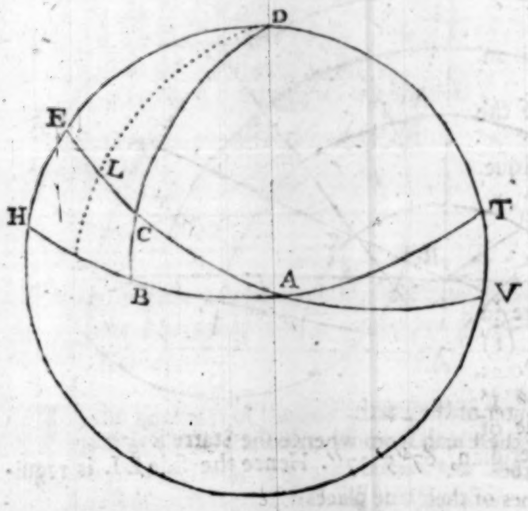
Or thus, which is all one.
As the Co-sine of Z Z 42d 31′ 11″, 9,874324
To the Radius 90d; 10,000000
So the Co-sine of Z E, 46d 1′ 25″, 9,841585
To the Co-sine of E L 21 58′ 8″ 9,967261

Which added to the *Medium Cœli* ♈ 13d 55′ 8″, maketh the 90d ♉ 5d 53′ 16″, to which adding three Signes, giveth the Ascendant 5d 53′ 16″ ♌, as before.

CHAP. XX.

To finde the Parallacticall Angle, or Angle of the Ecliptique with the Verticall Circle.

The angle of the Ecliptique with the Verticall circle (which I call the Parallacticall angle) is an Angle made by the Oblique cutting of the circle of altitude with the Ecliptique, which is right, or 90d, when the said circle passeth through the 90d of the Ecliptique, but falling without the same its Oblique, as the folllowing Diagram demonstrates, where,



D, denotes the Zenith.
D C B, the Verticall Circle.
D E H V T D, the Meridian.
T A B H, the Horizon.
V A E, a Semi-circle of the Ecliptique.
C, the angle of the intersection of the Ecliptique with the Verticall, which afterwards we call the Parallacticall Angle.

In the foregoing Chap. is shewed how to finde the Point of the Ecliptique Ascending at any moment, in any Region whatsoever, and how to finde the distance of any point of the Ecliptique from the same, which being obtained, with the Altitude of the same point above the Horizon, as is taught in the 10 Chap. we may come speedily to find the Parallacticall angle.

Admit the Sun at C, be in the first point of Gemini distant from the Meridian 45d *Ad Ortum*, as before, at which time the Suns Altitude is found by the 10 Chap. to be 43d 6′ 35″, and the point Ascending by the 19 Chap. is 5d 53′ 16″ Leo, from which point the Sun is distant 65d 53′ 16″ which known we have in the Triangle A B C, in the former Diagram. (1) A C 65d 53′ 16″. (2) B C 43d 6′ 35″, then to finde the angle A C B, the proportion is,

Tangent of A C, 65d 53′ 16″,	10,349131
Radius 90d;	10,000000
Tangent of B C 43d 6′ 35″,	9,971323
Co-sine of the angle B C A 65d 13′ 47″:	9,622192

Or in the Triangle D L C.

Tangent of D C 46d 53′ 25″,	10,028676
Radius 90d;	10,000000
Tangent of C L 24d 6′ 44″,	9,650868
Co-sine of the angle L C D 65d 13′ 47″:	9,622191

Therefore the Parallacticall angle is 65d 13′ 47″, there be other ways to finde the said angle, but more difficult, which for brevity sake, I passe by.

CHAP.

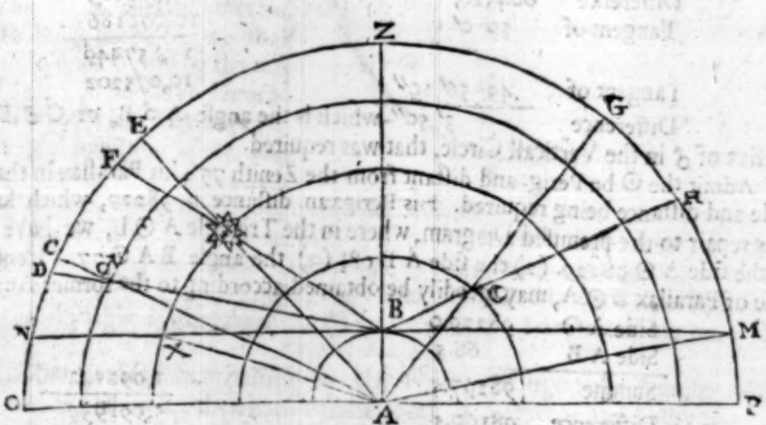
CHAP. XXI.

Of the Parallax of the Sun, Moon, and Starres.

THe true place of a Starre is a point of the Firmament shewed by a right line drawn from the Center of the Earth through the Center of the Starre, but the Visible or apparent place is determined by a line drawn from the eye, through the Center of the Starre.

Therefore the Parallax of a Starre, is an Arch of a great Circle passing by the Zenith, and the true place of a Starre, namely, the Arch of the same Circle intercepted between the true and apparent Place.

A Scheme shewing what the Parallax, or Diversity of Aspect is.



In this Figure, A denotes the Center of the Earth.

B, the Place of the Superficies of the Earth from whence the Starre is seen.

♂ ☉ ☾, Their places in their Orbes.

A ♂ C, A ☉ E, A ☾ G, the lines of their true places.

B ♂ D, B ☉ F, and B ☾ H, The lines of their apparent places.

Hence, the angle made by the intersection of the said two lines through the body of the Planet is the angle of Parallax, that is to say, in ♂ the angle A ♂ B, which (according to the 15 of the 1 of Elements) is equall to the angle C ♂ D. In the ☉ the angle of Parallax, is the angle A ☉ B. And lastly, in the Moon it is the angle A ☾ B, or G ☾ H, which is all one.

By this it is manifest, that the neerer a Starre is to the Horizon and Center of the Earth, the greater is the Parallax, and hence it is, that the Orbite of the Moon being neerest to the Earth, her Parallax is greatest and most perceptable, because the Semidiameter of the Earth beares a sensible proportion to the Semidiameter of the Moones Orbite, though it be very little, or nothing at all in comparison of the Orbes of ♄ ♃ and the fixed Starres, which is caused by the Intervall, and vast distance which is between them, for the Semidiameter of the Earth according to the Proportion of my numbers is exactly 68 $\frac{1}{11}$, which is its true Proportion to the Semidiameters of all the planetary Orbes.

CHAP. XXII.

To finde the Parallax of the Sun, Moon, and other Planets in the Verticall Circle, or Circle of Altitude.

IN the 10 Chap of this Book I have shewed how to obtain the true Altitude of the ☉, ☾ and Planets above the Horizon, and in the following Book have shewed likewise how to get their Distance from the Center of the Earth, at any time assigned, its therefore requisite I here shew how to finde their Parallax, or diver-

sity of Aspect, which I shall demonstrate both in Altitude, Longitude and Latitude; and first of the first, of which, for illustration, I shall set down three Examples.

1 The Altitude of ♂ above the Horizon, being 10d, and his distance from the Earth 60500, I demand his Parallax in that Altitude and distance. In the former Diagram, suppose K X ♂ T be the Orbe of ♂, wherein from X to ♂, I number the distance of ♂ from the Zenith X, 80d, which done, we have in the Triangle A ♂ B, (1) the side A ♂ 60500. (2) the side A B 68½. (3) the angle ♂ A B 80d. Hence, the angle A ♂ B, (which is equall to the Angle C ♂ D, will be 3′ 50″.

Side A ♂	60500.0	
Side A B	68.5	
Summe	60568.6	5,782247
Difference	60431.5	5,781263
Tangent of	50 0′	10,076186
		15,857449
Tangent of	49d 56′ 10″	10,075202
Difference	3′ 50″	

which is the angle A ♂ B, or C ♂ D, the Parallax of ♂ in the Verticall Circle, that was required.

2 Admit the ☉ be Perig. and distant from the Zenith 77d, his Parallax in that Altitude and distance being required. His Perigæan distance is 98229, which known, let us repair to the premised Diagram, where in the Triangle A ☉ B, we have given (1) the side A ☉ 98229. (2) the side A B 68½ (3) the angle B A ☉ 77. Hence, the angle of Parallax B ☉ A, may speedily be obtained, according to the former Analogie.

Side A ☉	98229.0	
Side A B	68.5	
Summe	98297.5	5,992542
Difference	98160.5	5,991937
Tangent	51d 30′ 0″	10,099395
	Ag.	10,091332
Tangent	51 27 40	10,098790
Whose Difference	2 20	

is the Parallax of the ☉ required.

Let us suppose the ☾ be Perig. and Distant from the Zenith 45d. Her Perigæan Distance A ☾ is 3873, which known, the Praxis is the same as before, for in the Triangle A ☾ B, we have A ☾ 3873. A B 68½ with the included angle B A ☾ 45 0′. Therefore,

As the Summe of the Sides A ☾ A B 3941.5,	4,595661
To the Difference 3804.5	4,580297
So the Tangent of 67d 30′ 0″	10,382776
To the Tangent of 66d 46′ 28″	10,367412

Rests angle B ☾ A 43′ 32″, which is equall to the angle G ☾ H, the Parallax of the ☾ desired.

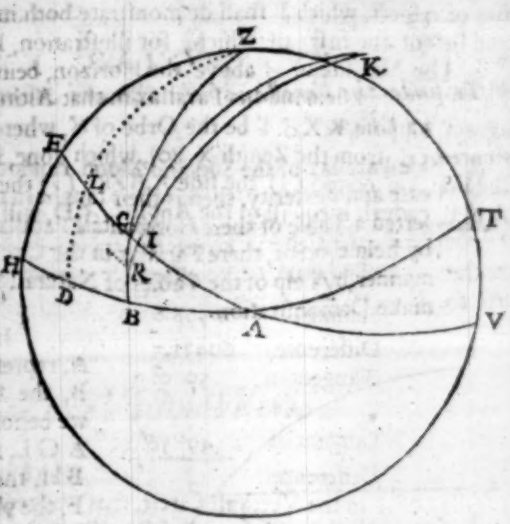
CHAP. XXIII.

Of the Parallax of the Sun, Moon and Stars, in Longitude and Latitude.

THe Parallax in Longitude is an Arch of the Ecliptique (or parallel thereto) intercepted between two great Circles whereof the one passeth from the Poles of Ecliptique and the true place, the other from the said Poles by the apparent place, so that the Parallax of Longitude is onely the Discrepancie, or Difference of the true and apparent Place according to the Longitude of the Ecliptique.

The Parallax of Latitude is an Arch of a great Circle passing by the Poles of the Zodiaque to the apparent place of the Starre, intercepted between two Circles of the Ecliptique equally distant, whereof the one passeth by the true place of the Starre, and the other by the apparent Place.

In



In the Diagram annexed, admit C be the true place of the Planet, R, the apparent place, and C R the Parallax of Altitude then is the Parallax of Longitude, the Arch of the Ecliptique C I, which is intercepted of the two great Circles K L, and K C. And the Parallax of Latitude is an Arch of the great Circle K I R, intercepted between I the Ecliptique, and the Pricked Line passing by R, a parallel thereof. These things premised, we shall hasten to practise, and by the way shall insert some short Directions, to know when they have Parallax of Longitude onely, and when Parallax of Latitude onely, and when Parallax both of Longitude and Latitude.

1 If the Verticall line (or line passing from the Zenith to the Planet) be the Signifer, there is then no Parallax of Latitude, but onely of Longitude.

2 If the Verticall line passing by the Planet fall directly upon the Signifer, making thereby right angles, there is then no Parallax of Longitude, but onely of Latitude.

3 If the Verticall line passing by the Planet fall upon the Signifer with oblique angles, the Planet then hath Parallax both in Longitude and Latitude.

CHAP. XXIV.

To Calculate the Parallax, both in Longitude and Latitude.

BY the 20 Chap we found, that when the ☉ is in o ♊, distant from the Merid. 45' *ad Ortum* the Parallactical is $65^{d}\ 13'\ 47''$, as it is represented in the Diagram of the last Chap. by the angle A C B, and because the Verticall line Z B, falls upon the Ecliptique E A V, with oblique angles at C, the ☉ hath therefore Parallax both of Longitude and Latitude according to the 3 Rule of the last Chap. wherefore to finde the Parallax of the ☉ in Longitude I C, and the Parallax in Latitude I R. I say,

I

As the Radius, 90^{d},	10,000000
To the Tangent of C R $2'\ 20''$;	6,831703
So the Co-sine of the angle R C I $65^{d}\ 13'\ 47''$,	9,622191
To the Tangent of C I $0'\ 59''$:	6,453894

II

As the Radius 90^{d},	10,000000
To the Sine of the Angle R C I $65^{d}\ 13'\ 47''$;	9,958083
So the Sine of C R $2'\ 20''$,	6,831703
To the Sine of R I $2'\ 7''$:	6,789786

Therefore the Parallax of the ☉ in Longitude C I is $0'\ 59''$, and the Parallax in Latitude R I is $2'\ 7''$.

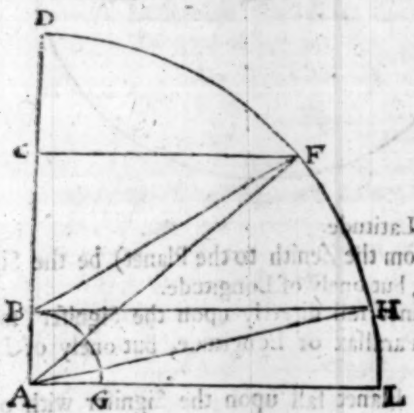
After the same manner may the Parallax of the ☾, and other Planets be found in Longitude and Latitude at any moment, in any Region, or Latitude whatsoever, by observing the premisses.

CHAP.

CHAP. XXV.

To finde the Parallax of the Sun and Moon, otherwise then is taught in the 22 Chapter.

THe Parallax of the Sun and Moon cannot possibly be obtained with more ease and dexterity, then is their taught in the 22 Chap. yet because I have inserted a Table of their Horizontall Parallax, I shall here shew you, how that by help thereof, there Parallax in the Circle of Altitude, may be found after another manner, by help of the Tables of Naturall Sines and Tangents. But I proceed first to make Demonstration.



In the Diagram annexed.

A, represents the Center of the Earth.
B, the Superficies or place from whence we behold the Starre.
A G L, the true Horizon.
B H, the apparent Horizon.
F, the place of a Starre. D, the Zenith.
L F, the Altitude.
D F, the distance from the Zenith.
A H B, the Horizontall Parallax.
A F B, the Parallax required in the Altitude given.

According to the Examples in the 22 Chap. we are to finde the Parallax of the Sun in the Circle of Altitude when he is Perig. and distant from the Zenith 77^d, and to finde the Moons Parallax in the said Circle when shee is also Perig. but distant from the Zenith D 45^d, therefore in this Diagram, I number the distance of the Sun from the Zenith 77^d, *viz.* from D to F.

B A F $77^d\ 0'$, whose Sine C F is,	97437
Sine of the Complement C A $13^d\ 0'$ *viz.*	22495
Sine of the Horizontall Parallax A H B $2'\ 22''$ Substr.	69
Rests B C	22426

Then in the Rectangled Triangle B C F, the Analogie is,

As B C 22426, to C F 97437. So B C the Radius, to the Tangent of the angle C B F 434482, whose Arch is $77^d\ 2'\ 20''$, from which detracting the angle C A F, $77\ 0'$ it leaveth the angle A F B $2'\ 20''$, which is the Parallax of the Sun in Altitude, agreeing to the Doctrine of the 22 Chap.

In the ☾.

Angle D A F, $45^d\ 0'$. Sine C F	70710
Sine of the Complement C A $45^d\ 0'$	70710
Sine of her Horizontal Parallax A H B $60'\ 49'$. Substr.	1769
Rests BC	68941

Then I say,

As B C 68941, to C F 70710. So the Radius B C 100000, to the Tangent of the angle C B F 102566, whose Arch is $45^d\ 43'\ 22''$, from which taking the angle C A F, $45^d\ 0'$, there remains the angle A F B $43'\ 32''$, which is the true Parallax of the ☾ in her Circle of Altitude, and is the same that was found in the 22 Chap.

This way I shew onely for Variety, not that I would have my Student apply this to Common use, as in Calculating Eclipses, and the like, in respect of the difficulty, but rather to make use of that in the 22 Chap. which is altogether as exact and far more easie and expedite, being performed by the Canon of Artificiall Sines and Tangents, which are inserted in this Book, whereas this manner of Operation is wrought by the Naturall. So that Multiplication and Division is here necessarily required, but in the other onely Addition and Substraction.

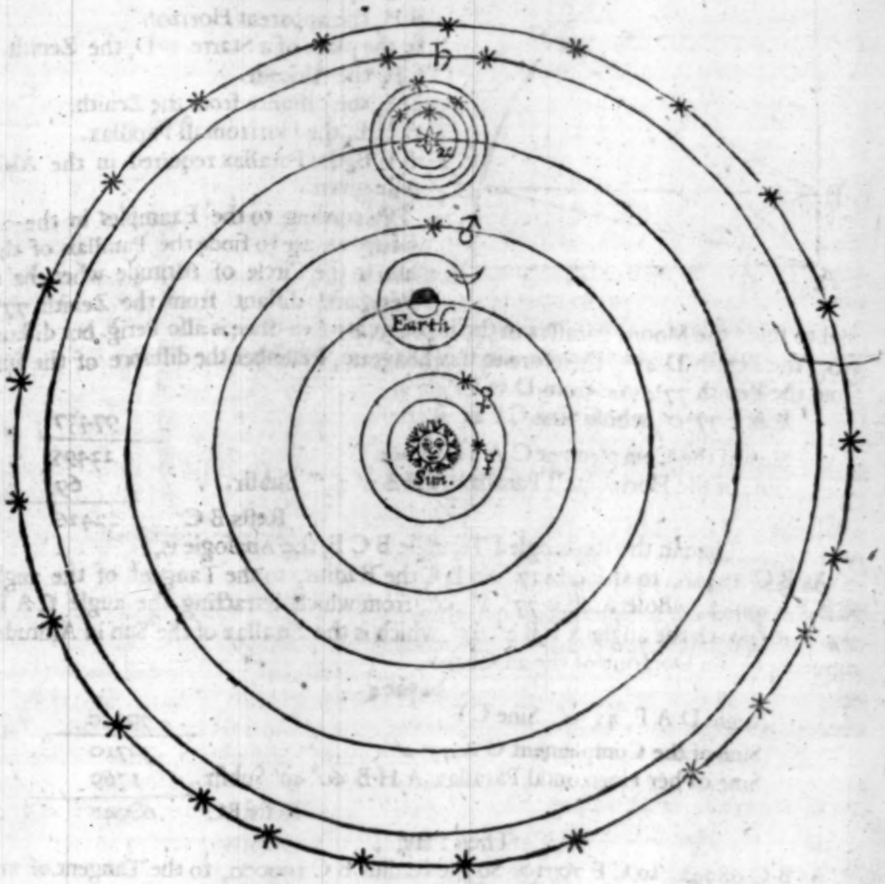
THE END OF THE SECOND BOOK.

HARMONICON COELESTE:

THE THIRD BOOK.

Conteining a new, accurate, and most easie Theorie of the *Sun*, *Moon* and other *Planets*, with the Order, Form, *and* Systeme *of the* WORLD.

The Systeme of the Visible World.



By VINCENT WING.

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HARMONICON COELESTE:

The Third Book:

CHAP. I.

THE Theoricall part of Astronomy, (so called *à Theoria*) is a doctrine whereby (as it were with Manuall Instruments) the Motions of the Planets are lively represented to the eye, for as in a Glasse wee behold the form, fashion, and also motion of the body, so may we by this Theoretical Doctrine, not onely see the form and order of the Sphæres and Orbes of all the Planets, but also apprehend most suddenly the common Accidents of all the Planets, and may thereby be able to salve all their apparent motions.

The Subject of this Theoreticall Doctrine is the proper motion of the Planets and Stars, which we call second motions, because that contrary to the apparent Diurnall motions of the Planets and Stars from East to West (which is an appearance caused by the daily motion of the Earth) their own proper Motions, of which wee shall here treat, are towards the contrary Part, namely from West to East.

The primary end of this Science is to salve the *Phenomena*, or appearançe of the Stars, and to finde their true places to any time given. The secondary end is to finde out the Scituation, Order and Form of the World, and the Parts thereof.

The Principles of this Doctrine, whereby wee come to salve the appearances in the proper motion of the Planets, *are these six following.*

1 That the ☉ is placed in the middle of the World, in or about the center of the Sphære of the fixed Stars, and hath no circular motion, but centrall onely.

2 That the primary Planets are each of them in their proper Systems, moved about the ☉, and accomplish their Periodicall Revolutions, most exactly in their determinate and appointed times.

3 That the Earth is one of the Planets, and with her annuall motion about the ☉, describeth her Orbe in the middle between the Orbes of ♂ and ♀.

4 That the secondary Planets are ordinarily moved about the primary Planets, respecting their bodies for their common Nodes or Centers.

5 That the Secondary Planet the ☾ is moved about the Earth, as her Center,

where by the annuall motion of the Earth hath not onely relation to the Earth, but by consequence to the center of the whole Sphære of the Earththy Planet.

6 That as this primary Planet the Earth is environ'd with the Sphære of the ☾, so are some of (if not all) the other primary Planets, who have in like manner their Moons, or Concomitants encompassing them.

CHAP. II.

That the apparent Heavens have no solid Orbs.

THere are very many, even to this present day, that suppose the Heavens have solid Orbes, who bring some superficiall, an seeming Reasons for their assertions, for if (say they) the Heavens have no solid Orbes, how should the Planets so exactly observe and keep their constant and regular Courses and Motions in the Heavens without the least jot of uncertainty, whereas if they should move as Birds in the ayre, it could not then be possible in Nature, but that they must deviate from æquality: For answer hereto, let such know this, that the motion in the Planets is essentiall, and given them of God (the Almighty Creator of all things) in the beginning, whereby (by the decree of an eternall Law) they are compelled to keep their constant and regular courses and motions in the Heavens, as experience daily verifies, but that the Stars should have solid Orbs we utterly reject it, as not probable (yea altogether impossible) *in Rerum Naturæ*, and this *Tycho* (refelling the solidity of those Orbs we call Cœlestiall) doth evidently prove three manner of ways, First, from the motion of Comets, Secondly, from the irrefraction of the Rayes of the Stars, and lastly, from the Positure of the Planets, and proportion of their Orbs. And certainly, were their Orbes solid, it were impossible for Comets to passe from one Orbe to another, in respect of their solidity, but the contrary is seene, as *Tycho Brahe* in his own time most acurately did observe, the same is dayly verified from the light and appearnce of the Starres, for the earth being placed out of the center of the Planetarie Orbes, it must necessarily follow, that if their Orbes were solid, their light would be more dim, and their bright Rayes appear more broken and refracted, and hence would follow a Multiplicity of refractions, insomuch, that the Rayes of the Stars being tossed from one Orbe to another, would be so diversly multiplyed, that in short time, the Planets and Starres should appear very irregular in motion, and in places far distant from their true Seates in the Heavens, so that in one volution of this terreneall Planet we live on, there would appear a wonderfull variety in their motions and distances. Lastly, the noble *Tycho* finding by his acurate Observations, that the Planet ♂ in his Achronicall Positures, was neerer the earth then the ☉, and sometimes far mounted above him, he thought this permutation could not be possible if there were solid Orbes, seeing that the Orbe of ♂ should intersect and cut the Orbe of the ☉, although this of *Tycho* holdeth not altogether true, that these Orbs should cut each other, yet according to the Genuine Hypothesis and Systeme of the World aforegoing, this of *Tycho* is really verified in the Secondarie Planets; as in the ☾, that moves about the Earth, who twice in her revolution intersects the Earths Orbe, and the like may be said of those Concomitants, or Guardians of ♄ and ♃, which move about their Bodies, and intersect their Orbes, as the ☾ doth the Orbe of this Terrestiall Ball, and now if this be not sufficient to prove a fluidity of Substance in those parts we call the Heavens, wee must then confesse a mutuall penetration of their solid Orbs, or else denie the motion of the Heavens, both which common reason tels us to be impossible, and not to be admitted of.

CHAP.

CHAP. III.

That the Sun is the Center of the Visible World.

IN the following Chapters of this third Book, it will evidently appear to every cleer-sighted man, that what we shall here deliver concerning this point is nothing but truth, the first that entertain'd this opinion for reall, was *Philolaus Pythagoras*, whose iudgment and dexterity of apprehension was most exquisite, notwithstanding those brutish times wherein he lived, but after ARISTOTLE had drawn the World to favour his fond conceits, this famous discoverie of the truth became to be eclipsed, and so continued for many Centuries of Yeares, yea even untill this last age, when it pleased God to raise up some noble and heroick wits to make an absolute discovery, insomuch that now this opinion is by all our best Masters of Astronomy, granted for no lesse then truth, for as the continued observations of all Astronomers in all ages, do perspicuously prove the same, so is it most proper that the ☉ which is the most worthy body of all the Planets, should retain the most worthy place amongst them, which must needs be acknowledged to be the Center, besides if we do but consider, the Sphæricall forme of the World (which you may discerne by the former Systeme) is it not then (I say) most proper, that the ☉ (who is the onely giver both of light and heat to all the Planets round about him) be in the Center? from whence he may best disperse the same (by sending forth his Radiant beames) into all parts of the Circumference, which otherwise cannot so well be done, were he placed in the Circumference, or any other point without it, but onely in the middle. And lastly, is it not most certain that the two Planets ♀ and ☿ respect no other Center then the ☉, and so being placed within the Orbe of the Earth, towards the Center, they can never appear to us (in this middle Planet) neither to be in □, nor ☍ of the ☉, and this was the main cause that induced the Ancients to assign them a mean motion equall to that of the Sun, and refer the inæquality or motion to those fictious Epicycles. The like may be said of the other three primary Planets placed without the Orbe of of the Earth, though it be not so perceptable to vulgar apprehensions, and for further proofe of this assertion infinite reasons Astronomicall might be given, but I passe them by, hoping that the following Demonstration in this Booke, will be sufficient to evince the most stiffe opinion oppugnant hereunto, therefore seeing the ☉ is the Eye of the World, and very Fountain (it self) of pure light, the Center doth of right most fitly belong unto him, from whence (one every side) he may directly behold the most fixed concave of all the Planets and Stars with right angles.

CHAP. IV.

Of the order of the other Sphæres.

THere are seven Planets observable (besides the Concomitants of ♄ and ♃) whose Orbes are imaginarie Circles, whereon their glittering bodies move and wheel about, (as is described in the Systeme of the World.) Those we call primary Planets, whose bodies move simply about the ☉, and those secondarie Planets which turn about the primary Planets, whereby it comes to passe, that besides their own proper motion about the body of their primary Planet, they participate also of the motion of the said primary Planet, which moves about the ☉. Of this kind ♄ is observed to have two secondary Planets encompassing his body, which by help of the Telescope, are found to be sometime neer, and sometime further remote from him. In ♃ is observed four Stars of like kinde, which wheel about his body, as their proper Center, the first is distant from him to the sight about 6 Semidiameters of the Earth, the second 8, the third 10, and the fourth some twenty. These secondarie Planets (as the Order of the other Planets is) when they are above ♄ or ♃ are moved from West to East, but being under them, they are moved to the

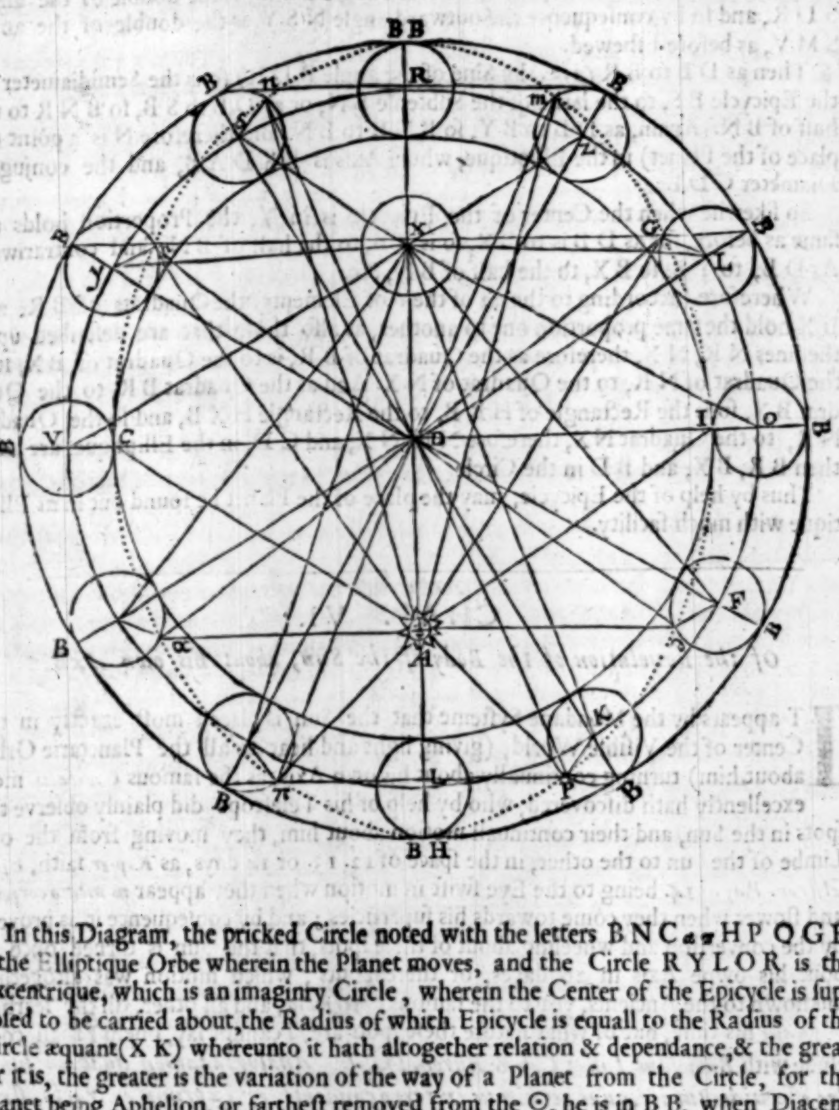
contrary, as in respect of the Earths Position, and by this meanes come sometime to interpose, and sometime to be hidden of their primarie Planets, about which they move. The first of these next the Center, accomplisheth its Revolution about ♃ in one day 18 houres, the second in three dayes 13 houres, the third in 7 dayes, 4 houres, and the fourth and farthest from him, in 16 dayes and 5 houres. In like manner the Earth hath one, which we call the Moone, who by reason of her vicinity to the Earth, appears very great to our beholdings, though its probable, that in her self, she is as small in magnitude as the Companions of ♄ or ♃; but as for ♂ ♀ and ☿ it cannot well be observed, whether they have any of like nature about them, or no, but we shall not at this time treat further of these secondarie Planets excepting the ☾, in regard, their motions are not yet well known, neither by few observed, and therefore shall treat of those observable, and by the way shall shew how to describe the Ellipsis, wherein the Planets move, and how by the help of two Circles, it may be projected by a neat Artifice, whose Demonstration followeth in the next Chapter.

CHAP. V.

Of the Elliptique wherein the Planets move, and of the projection thereof.

IT appeares by observation that the Wayes of the Planets in the Heavens are Elliptical, the first vigilant Observer thereof was the admired KEPLER, since whom it is received as a generall Truth, and though it cannot so well appear in ♄ ♃ or ♀ yet in ♂ and ☿ its very perceptable, as may be gathered from acurate Observation. In which Elliptique there is an imaginarie point distant from the Center towards the Aphelion, the half of the first Inæquality, which we call the Cone or Umbilique point, to which place the Equality of motion is referred. And because the point of the middle motion, is distant from the point of the apparent all the first Inæquality, the Center and middle of the Elliptique Orbite, is placed exactly between the points of the middle and apparent motion, so that the Center of the Elliptique is removed so far from the point of the apparent motion, as it is from the intersection of the Axis of the Cone, whereby both the point of the middle motion, and the point of the apparent, which is the ☉ are called Umbilique points, both which are of speciall use in the indagation of their motions. Now to finde the place of a Planet in his Elliptique *Kepler in Epit. Astro. Copernic.* teacheth how it may bee obtained, but *Bullialdus* (to make the operation more easie) shews how to performe the same by an Epicyle, whose motion is double to the motion of a Planet in his Orbite, and so by the solution of right lined Triangles, it may be found with more ease, which way wee embrace, as very rationall, though wee somewhat dissent from him in the Proportion thereof, for *Bullialdus* imagineth the Æquation of the first part of the Inæquality, to arise from the inæquall habitude of the Elliptique, and Circle Equant, which is nothing but a meer supposition, and *Kepler* thinks it onely Physicall, but I differ from both therein, and take the first part of the said Æquation to arise from the same cause the latter doth, namely, to emerge from the Intervall, or distance of the Conicall point of Æquality from the Center of the Elliptique, as the latter doth from the distance of the other Umbilique from the said Center, yet admitting of Variation in the Circle Equant, whose motion and magnitude is supposed to be equall in all respects with that of the Epicycle, and thereby the Variation relates to the motion of the Epicycle, diminishing the angle of the Excentricall Æquation when a Planet is in the higher part of his Orbite, and is inclining in his Elliptique Path, towards the Center, but when he comes into the nether part thereof, and begins again to decline, and depart farther from the Center, the Variation augments the said angle by little, according to the motion of the Equant, which hath altogether relation and dependance upon the Epicycle. Now in regard the Orbe wherein the Planet moves is Ellipticall, as I said before, I shall therefore here shew how the Ellipse may be projected by two Circles, which way is both demonstrative, and consentaneous to truth and observation: For Demonstration sake, I have added the following Figure.

In



In this Diagram, the pricked Circle noted with the letters B N C α π H P Q G B, is the Elliptique Orbe wherein the Planet moves, and the Circle R Y L O R is the Excentrique, which is an imaginry Circle, wherein the Center of the Epicycle is ſuppoſed to be carried about, the Radius of which Epicycle is equall to the Radius of the Circle æquant (X K) whereunto it hath altogether relation & dependance, & the greater it is, the greater is the variation of the way of a Planet from the Circle, for the Planet being Aphelion, or fartheſt removed from the ☉, he is in B B, when Diacentron, he is in C, and when he is Perihelion, he is in B H, ſo that when a Planet moves from B B towards C, the motion of the Epicycle is double thereunto, but to the contrary part, that is to ſay from B, by N to Y, as when the Center of the Epicycle is in S, diſtant from his Aphelion 30^d, the motion of the Epicycle B N is 60^d, ſo that when he comes to C 90 from the Aphelion, the motion of the Epicycle B C is 180^d, becauſe the motion of the one is double to the motion of the other, by which meanes the Epicycle deſcribes the Elliptique Orbe of the Planet, and ſerves to finde his true place in the ſaid Elliptique, and his true diſtance from the Aphelion thereof. But for further illuſtration obſerve, that from the Hypotheſis of this double motion of the Epicycle, the angle B S N is double to the angle R D S, and the angle B Y N to the angle R D Y, &c. Now becauſe the angle B S N is double to the angle R D S, and S D V is the complement to the right, (but the angle N S Y, is the complement of the angle B S N to two right angles, which is the double of the angle S D R) therefore alſo the angle N S Y ſhall be the double of the angle S D V, for the Complement of the Double to the Semicircle, is the Double of the Complement of the ſimple Angle to the Quadrant.

When the Center of the Epicycle is in S, the Planet is in N, and ſo the angle N B S

is equall to the angle B D V, and the inward angle B S N, is the double of the angle S D R, and so by consequence the outward angle N S Y, is the double of the angle S M V, as before I shewed.

Then as D B to B R (*viz*. the Sine of the angle B D R) so is the Semidiameter of the Epicycle B S, to the halfe of the Subtense B N, or as D B to S B, so B N R to the half of B N. Again, as D B to B Y, so B N R to B N, and therefore N is a point (or place of the Planet) in the Elliptique, whose Axis is B X D A B, and the conjugate Diameter C D I.

So likewise when the Center of the Epicycle is in Y, the Proportion holds the same as before, for as D B is to B X, so is Y B, to the half of B N, and contrariwise, As D B, to Y B, so B X, to the half of B N, &c.

Wherefore (according to the 22 of the 6 of Elements) the Quadrats of B R, and B X hold the same proportion one to another, as also those that are described upon the lines N R, N X, therefore as the Quadrat of B R, is to the Quadrat of B X, so is the Quadrat of N R, to the Quadrat of N X. And as the Quadrat B R, to the Quadrat B X, so is the Rectangle of H R B, to the Rectangle H X B, and so the Quadrat N R, to the Quadrat N X, therefore N R, N X, and C D, in the Elliptique, are lesser then B R, B X, and B D in the Circle.

Thus by help of the Epicycle, may the place of the Planet be found out in its Elliptique with much facility.

CHAP. VI.

Of the Revolution of the Body of the Sun, about his own Axis.

IT appears by the Mundane Systeme that the Sun is placed most exactly in the Center of the Visible World, (giving light and heat to all the Planetarie Orbes about him) turning continually about his own Axis, as the famous *Galilaeus* most excellently hath discovered, who by help of his Telescope did plainly observe the spots in the Sun, and their continuall motion about him, they moving from the one Limbe of the Sun to the other, in the space of 12. 13. or 14 days, as *Kepler* saith, *Epit. Astron. Pag.* 514. being to the Eye swift in motion when they appear *in medio corpore*, and slower when they come towards his superficies; and by consequence it is proved, by the conversion and wheeling about of these spots, that the Sun is turned once about his owne Axis in 26 dayes, or thereabouts, which motion was altogether unknown to the Ancients, yea to the famous *Copernicus*, and all other, till the learned *Galilaeus* his time, but of what nature these spots are, I cannot say, onely I shall conclude with *Bullialdus Lib* 1 *Cap.* 8 *Astron. Philos. Analogia tamen quadam similes esse videntur iis, quas cernimus in ferro candenti, & exprunis extracto, stricturis, vehemente igni, quo ferrum incensum est, propulsis & à massa secretis. Possumus itaque existimare maculas illas esse fuligines è massa Solis vi caloris expulsas, quemadmodum alicubi* Galilæus *explicavit.*

CHAP. VII.

Of the diurnall resolution of the Earth, about her own Axis.

OVer and besides the annuall motion of the Earth (which in this Book is cleerly proved) she hath also a Diurnall motion about her own Axis, as Observation daily and hourly manifests, for should it otherwise be, that the Earth should not be turned about her own proper Axis (*Motu diurno*) it would follow, that the Stars should not every day be seen to rise and set, yea those people who live under the Equinoctiall might then observe some of the Stars always *Supraterranean*, and some again always *Infraterranean*, which agrees not to the Phenomena

nomena, but directly opposeth the verity of our Hypothesis See *Bullialdus (alias Philolaus) De Systemate Mundi*, *Pag*. 132, where he proveth that the Earth is moved throughout the whole Zodiaque annually about the Sun, and daily about her own Axis, as he there demonstrates, to which Book I referre the Reader.

CHAP. VIII.

Of the Æquation of Civill Dayes.

I Shall not here shew the variety of opinions amongst Authours concerning the Æquation of naturall Dayes, and how it hath been a Point much controverted, yea even of late yeares amongst famous Scholers, and Astronomers of great note. The Ptolomaick Æquation was entertained by *Alphonsus*, *Copernicus*, and by the Authour of Prutenick-Tables, *Reinhold*, and generally by all others, till the learned *Tycho* gave it a stop, who by his acurate Observations of Eclipses and the Moons motions, did endeavour to make a restitution, he admitting onely of the Inæquality as it ariseth from the disagreement of the Equinoctiall and the Ecliptique, which his learned Successour *Kepler* in part rejects, and would have the said Æquation to emerge from the Difference between the middle place of the Sun, and the Right Ascension of his true place, which is more rationall and demonstrative: but *Bullialdus* (whom we follow in this particular) doth herein somewhat dissent both from *Tycho* and *Kepler*, for besides the Tychonick Æquation (which ariseth from the difference of the right Ascensions of the Equiuoctiall and Zodiaque) he introduceth also a secondarie Æquation from the Inæquality of the daily Revolutions of the Earth about her Axis, occasioned by the Excentricity, or Excentrique Æquation, which causeth the said Inæquality in her Revolution about her Axis, as by the Theorie of the Earth doth appear. Now therefore that the Æquation of dayes arising from these two Fountaines may be found, we are to gather the Right Ascension of the point given, and the difference between that and the true place is the first part of this Æquation; & that we may know whether it doth augment or diminish the middle time, we must consider whether the Right Ascension be greater or lesser then the Suns true place, if greater it substracts, but if lesse it adds to the middle time. Next we are to observe that the inæquality of the Earths motion about her Axis, may either augment or diminish the same, for in the former semicircle, when the Co-æquate Anomalie is lesse then 6 Signes, the former part of the Æquation is diminished, but in the latter semicircle it is encreased, according to the proportion of the Excentrique Æquation.

When the Sun enters ♊ his Right Ascension is $57^{d}\,48'\,6''$, hence the Difference between the point given and Right Ascension thereof, is $2^{d}\,11'\,54''$ and so much is the Sun past the Meridian in respect of the middle time, and Right Ascension of that Arch; but in regard the Sun is in the second semicircle (here I speak according to appearance) the Excentrique Æquation $36'\,49''$ substracteth from the same, according to the quantity thereof, and therefore the true Æquation is but $1^{d}\,35'\,5''$, which converted into time, produceth $6'\,20''$, which is the true Æquation of time, that was desired.

CHAP. IX.

Of the Theorie and Motion of the Earth.

ALthough its probable the Sun have a motion about his own Center, yet its most certain he is scituate in the very Center of the World, and is the common Node of the Planetarie Systeme, as is demonstratively proved throughout this Book, and that the Earth in the middle of the other Planets) wheeleth about the Sun, making her Periodicall Revolution in 365 Dayes, 5 houres, and 49′. and the other Planets, some in longer, and some in shorter time according to the

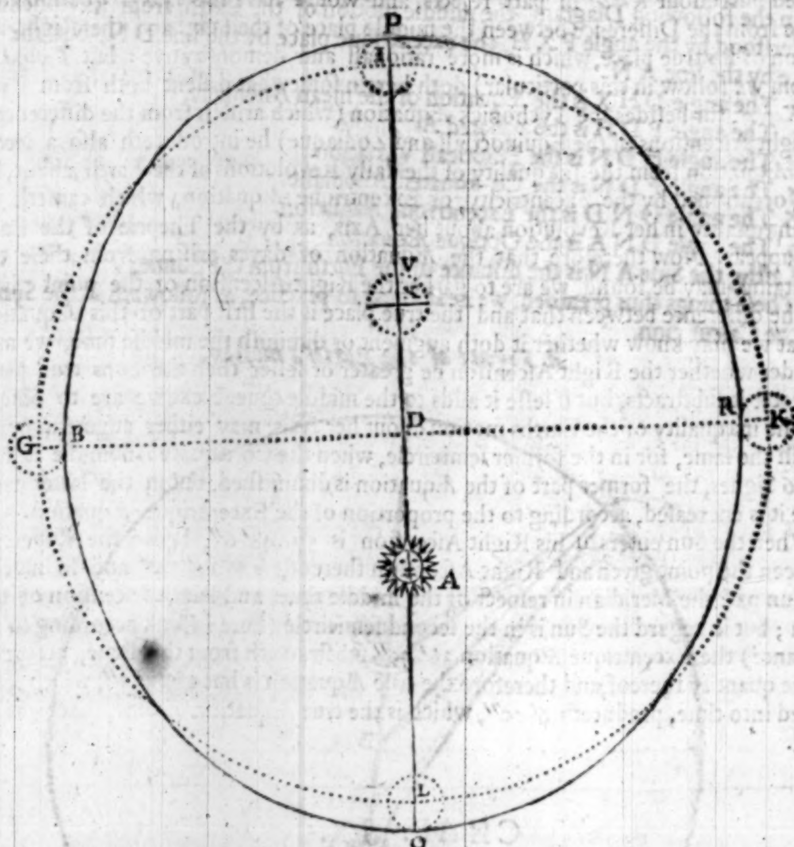
Quantity

Quantity and Proportion of the ir Orbites. And besides this annuall motion of the Earth in its own Orbite, which is Excentrique to the Sun, she hath likewise a Diurnall motion about her own Center which she finisheth in 24 houres, making thereby the Day Naturall, of both which motions I have treated elsewhere.

Now whereas PTOLOMIE and other Writers begin first with the Sun, as Moderator of all the other Planets, I shall not much digresse, and though not admitting of any Orbicular motion, of the ☉, yet keeping and retaining his place as a fixed Point, contermine to the Centers of all their Orbites, by help whereof the true motion of the Earth and other Planets may be obtained with much Dexterity and Demonstration.

And for as much as the apparent motion of every Planet depends upon the motion of the Earth, I shall here begin first with the Theorie of the Earth (or ☉ if you will so have it) and describe all such Lines, Arches, Angles, Orbes, and Points, as are needfull and requisite to be known for the Calculating his Motion, and afterwards by the Doctrine of Triangles, shall give you in the following Paradigmataes, a brief Synopsis of the Calculation.

A Figure of the Motion of the Earth about the Sun.



In this Diagram, A, denotes the place of the Sun and Center of the World: X, the Center of the Equant: D, the Center of the pricked Circle, or Excentrique of the Earths Orbite, whose Semidiameter D I, or D G contains 100000. In the Perimeter whereof is placed four Epicycles, the first in I, the second in G, the third in L, and the fourth in K, which are there set down, not to shew any motion of the earth in the Perimeter of them, as prudent Antiquity for want of other helps devised, but to finde thereby the Inclination of the Earths Orbite, and Place of the Earth therein.

The

The Ecliptique noted with the letters P B Q R P represents the Orbite of the Earth, whose Aphelion Semidiametient is marked with P D Q, the Diacentron Diametient with B D R. The true motion of the Earth in this Elliptique (being numbred from P) is to be obteined by help of the little Epicycle, whose Center is supposed to be carried about in the Circumference of the pricked Circle, and the motion of this Epicycle, is double to the æquated motion of the Earth, though to the contrary part; so that when the Earth is Aphelion, she is placed in P, the upper part of the Epicycle, but being at B, 90^{d} distant from her Auge, she is then in the lowest part thereof, that is to say 180^{d}, from the Aphelion of the Epicycle, because the motion of the one is double to the motion of the other.

Upon the point X, is described another little Circle (which we call the Equant) whose Semidiameter X V (being equall to the Semidiameters of one of the Epicycles) is 16 parts, the Center of this Circle is distant from D, the Center of the Orbite 1787, being directly opposite to A, the Suns place, and this Circle serveth chiefly to finde the Inæquality of the Excentrique Circle, or Bi-sected Excentricity, for when the Earth is Supra Diacentron, or in the higher Semicircle R P B, the variation is to be numbred in the lowest Semicircle X W, but the Earth being Infra Diacentron, or in the nether Semicircle B Q R, the variation is to be accounted in the Semidiameter of the higher Semicircle from X towards V.

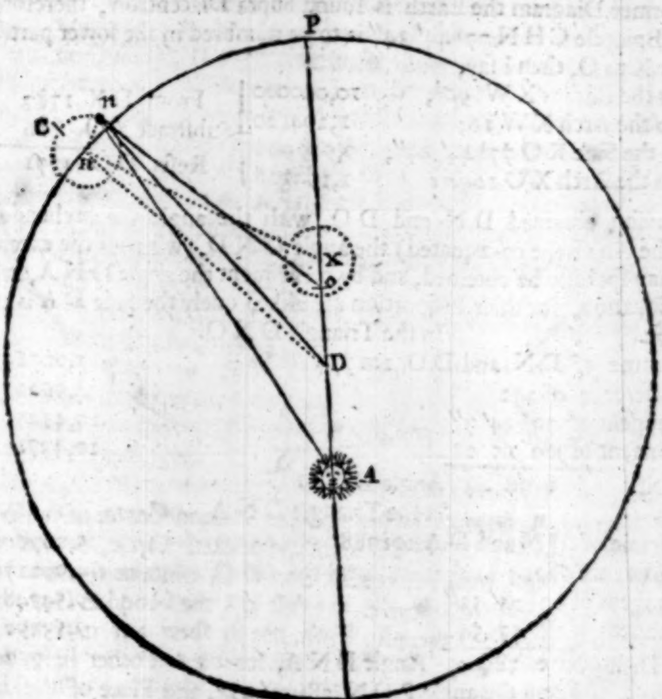
In the following Diagram, the middle motion of the Earth from its Aphelion is understood by the angle P X H, the excentrique place by the line D N, but the true place by the line A N.

2 The angle D H X is the Æquation of the mean Anomalie.
3 The angle P D H is the æquated Anomalie.
4 The angle H D N is the Ellipticall Variation.
5 The angle P D N is the Co-æquated Anomalie.
6 The angle O N D is the Excentrique Æquation.
7 The angle D N A is the Optique Æquation.

Lastly, the Side A N is the distance of the Earth from the Sunne,

These things thus premised, we next come to practice, as followeth in the Synopsis of the Calculation.

A Figure of the Earth's motion.



July 28 1650 at 12 noone, I observed the true place of the ☉ (by help of a Quadrant of 6 foot Radius) in $14^{d}\ 49'$ ♌, at which time according to my Tables the middle motion of the Sun is $136^{d}\ 5'\ 46''$, and the Aphelion of the Sun $96^{d}\ 34'\ 23''$, which being deducted from the Suns middle motion, leaveth $39^{d}\ 31'\ 23''$, which I number in the former Diagram from P the Aphelion to H, and so much is the angle P X H.

Therefore in the Triangle D X H, having D H and D X given, with the angle D H X, the angle D H X will be $0^{d}\ 39'\ 6''$: for the Analogie is,

As D H 100000,	5,000000
To the Sine of the angle D X H $39^{d}\ 31'\ 23''$;	9,803723
So D X 1787,	3,252125
To the Sine of the angle D H X $0^{d}\ 39'\ 6''$:	8,055848

From the simple Anomalie P X H	39^{d}	$31'$	$23''$
Substract the angle D H X		39	6
Remains the æquated Anomalie	38	52	17
Angle C H N	77	44	34

In the Triangle D H N.

1

D H 100000
H N 16
Angle D H N 101 56 38 } given

Angles { D N H, H D N } Side { D N } required

Summe of D H and H N 100016		5,000069
Difference 99984		4,999930
Tangent of $38^{d}\ 52'\ 17''$		9,906375
Tangent of 38 51 45		9,906236
Aggregate 77 44 2	Angle D N H	
Difference 0 0 32	Angle H D N	

2

Sine of the angle H N D $77^{d}\ 44'\ 2''$	9,989971
D H 100000	5,000000
Sine of the angle N H D $77^{d}\ 44'\ 34''$	9,989986
Side D N 100003	5,000015

From the æquated Anomalie P D H	38^{d}	$52'$	$17''$
Angle H D N substract			32
Rest Co-æquated Anomalie P D N	38	51	45

In the former Diagram the Earth is found Supra Diacentron, therefore the motion of the Epicycle C H N $77^{d}\ 44'\ 34''$ is to be numbred in the lower part of the Equant from X to O, then I say,

As the Radius X W 90^{d},	10,000000
To the Arch X W 16;	1,204120
So the Sine K O $77^{d}\ 44'\ 34''$,	9,989986
To the Arch X O 16 *fere*	1,194106

From D X	1787
Substract X O	16
Rests D O	1771

Now having obteined D N and D O, with the angle comprehended N D O (which is the Anomalie co-æquated) the angle O N D, (which is the excentrique Æquation) may speedily be obteined, and by consequent the angle D N A, which is the Optique Æquation, for their Proportion are alike, onely the Side D A is 1787 without variation.

In the Triangle D N O.

Summe of D N and D O 101774	5,007637
Difference 98232	4,992253
Tangent of $70^{d}\ 34'\ 7''$	10,452505
Tangent of 69 55 23	10,437121
Dif. 0 38 44 Angle D N O	

In the Triangle D N A

Summe of D N and D A 101788	5,007696
Difference 98214	4,992173
Tangent of $19^{d}\ 25'\ 52''$	9,547486
Tangent of 18 47 50	9,531963
Dif. 0 38 2 Angle D N A.	

From the angle P D N	38^{d}	$51'$	$45''$
Angle D N A Substr.		38	2
Rests angle D A N	38	13	43

Againe

Again in the Triangle D N A.

Sine of the angle D A N $38^d\ 13'\ 43''$,	9,791551
D N 100003;	5,000015
Sine of the angle A D N $141^d\ 8'\ 15''$,	9,797592
A N 101402:	5,006046

Excentrique Æquation D N O	0^d	$38'$	$44''$
Optique Æquation D N A	0	38	2
Absolute Æquation	1	16	46
Middle Motion of the Sun	136	5	46
Æquation substract	1	16	46
True Motion of the Sun	134	49	0

Therefore the true place of the Sun the said 28 of July 1650 at noon, was in $14^d\ 49'\ 0''$ ♌, agreeing to Observation.

CHAP. X.

Of the Theorie and Motion of the Moon, and of the various In-æqualities in her Motions.

ALthough the Moon be a secondarie Planet, and is far lesse in magnitude then any of the rest, yet in regard shee attendeth (as it were) upon the Earth, and giveth greater light thereon then any Planet, and also describeth the Moneths of the Year, I do therefore hold it meet to place her Theorie next unto the Earths, (or the Suns as vulgarly accounted) according as all the ancient Astronomers have done before us, whose Footsteps in this particular I shall here follow.

1 Now as the Earth and other Planets do each of them in their Peculiar Orbites move about the Sun, so doth this secondarie Planet the Moon move about the Earth, and so not onely the Earth, but also the whole Systeme of the Moon is carried about the Sun in a Year, and hence it is that there ariseth a threefold Inæquality in the Moons motion. The first is Periodicall, the second Synodicall, and the third annuall. Her Periodicall Æquation is to be obteined after the manner of the other Planets, for it is of the same Quality, though differing in Quantity, as immediately we shall demonstrate; but her Synodicall Æquation hath dependance upon her Elongation from the Sun, and is caused by the oblique scituation and vast emotion of her whole Systeme out of the Center of the World, for the Earth (which in her mean distance is from the Sun 100000) is the Umbilique point of her Orbite, about which she keepeth her constant gyre and motion as the primarie Planets do about the Sun, who is the Center of the World. The third Inæquality is but small, and is onely caused by the variation of the Earths distance from the Sun, which may somewhat augment or diminish the angle of her Synodicall Æquation, but I proceed to make Demonstration severally of all such Lines, Circles, Arches, Orbites, and Points, as are needfull to be known for Calculating her Motion.

2 The Auge of the Moon is a point of the Orbite wherein when the Moon is placed, she is farthest remote from the Center of the Earth, the daily motion thereof being $6'\ 47''$, according to the Succession of the Signes, from which point the Anomalie of the Orbite is accounted.

3 The Orbite of the Moon is an imaginarie Elliptique Circle (like to that of the Earth) which carrieth the Moon about from West to East according to the successi-on of the Signes, though it is observed to be with some irregularity about its own Center, for the conversions of her Orbite are regular and made equall by the Center of the Circle Equant, which is the very point it self of Equality: and because the Center of the Equant, is in respect of the Earth, a point placed towards the Auge (*viz.* in the line of the Auges) it most evidently shewes, that the Motion of the Moon in her Orbite (according to the primarie Planets) is slower when she is Supra Diacentron, or in the upper part of her Circle and swiftest when she is Infra Diacentron,

or the nether part thereof, because (as I have shewed in the Theorie of the superiour Planets following) a lesser Portion of the Orbite belongs to the upper part of the Circle Equant, then doth to the nether part thereof.

4 The Circle Equant is a little Circle described upon the Center thereof X, whose Semidiameter X V contains onely two parts, whereof the Radius of the Moons Orbite D A is 4047 and this Circle serves to finde the variation of the Excentrique Inæquality, which is found (as afterwards is taught) by numbring the double of the Anomalie æquated in the nether part thereof when she is Supra Diacentron, but in the upper part if she be Infra-Diacentron.

5 Upon the point D, which is the Center of the Orbite, is described an imaginarie Circle, in the Perimeter whereof is placed a little Epicycle, whose Semidiameter is equall to that of the Equant, and the motion thereof is double to the æquated Anomalie, being accounted from I, the Auge thereof, to N, &c. so that when she is in the Auge or opposite Auge of the Excentrique, she is always then in I, the Auge of the Epicycle, but being in K, 90^{d} distant from her Auge, she is then 180^{d} from I, the Auge of the said Epicycle, for the motion of the one is double to the motion of the other.

6 The Excentrique Æquation is an angle at the Moon understood in the second Figure following by the angle O N D, so that the Excentrique place of the Moon is shewed by the line D N, which ariseth from the Excentrique Excentricity D X, being corrected by the variation thereof.

7 The Optique Æquation is an angle at the Moone arising from the other half of the bi-sected Excentricity D A, being understood by the angle D N A, so that the place of the Moon from the earth, (as in respect to her own Orbite) is shewed by the line A N. And you are to note that the Summe or Aggregate of these two æquations is called the Compound, or absolute æquation, which is to be substracted from the middle motion in the former Semicircle P K Q, and to be added in the latter, as the Figure it self demonstrates.

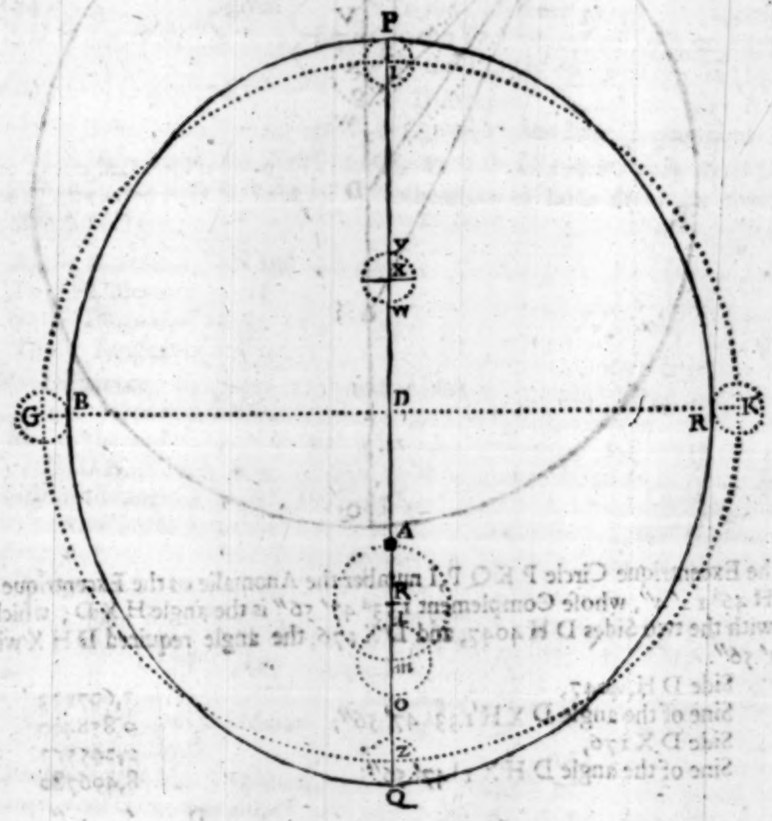
8 But the Moon being a secondarie Planet, running her Course about the Earth, and retaining it for her common Node, as the primarie Planets do the Sun (who is the Center of the Signifer) it thence followeth that the Moon, in respect of the emoved Seats of her whole Systeme, must necessarily be subject to a second Inæquality (as is said before) because the visuall line of her appearance, from A the Center of the Earth (which is not the Center of the Signifer) falls with oblique angles upon the Zodiacall Circle, and this is very apparent, for when her visuall place concurres with the line of the Sun, making thereby Right angles with the Zodiaque, which is always in her Conjunction or Opposition with the Sunne, she is then found to be altogether void of this second Inæquality, as in its following place I have shewed.

9 Upon the point R, is described an imaginarie Circle, devised to finde the Synodicall Æquation of the Moon, whose Center R, is distant from A the Center of the Earth 88 parts, in the Circumference whereof, moves a lesser Circle, whose Center is noted with the letter M, which is devised to finde the Synodicall Variation of the Moon. In the former, we call the angle R N M the Synodicall Æquation, and the angle R N M the variation thereof. And here note that the Synodicall Æquation consists of three parts, the first part (as is described in the second figure following) contains the angle A N R, and is found by giving the angle A, and the sides including it, *viz.* A N, and A R. The second part of the said Æquation doth sometime adde, and sometime diminish therefrom, for in the Circumference of the greater Circle from A by Y to M is numbred the Synodicall Anomalie, whereby the angle R N M is the second part of the Inæquality, and in the Example following is found to diminish the former part. Lastly, to finde the variation, I number the Synodicall Anomalie in the little Circle from L by Y to O, and I finde the angle of Variation to be M N O, which in this Example augments the Quantity of her Synodicall Æquation according to the Proportion thereof.

The

The particular Dimensions of the Moons Orbite.

Semidiameter of the Circle D G or D I.	4047
Semidiameter of the Epicycle B G or I P.	2
Which in the Circle Equant equalizeth X V or X W.	2
Bi-sected Excentricity D X or D A.	176
In the Ellipsique.	
Aphelion Semidiametient D P, or Perihelion D Q.	4049
Diacentron Semidiametient D B or D R.	4045
In the Circle of her Synodicall Revolution A M A.	
Semidiameter R M, or R A.	88
In the Circle of Variation O L O	
Semidiameter M O.	48



CHAP. XI.

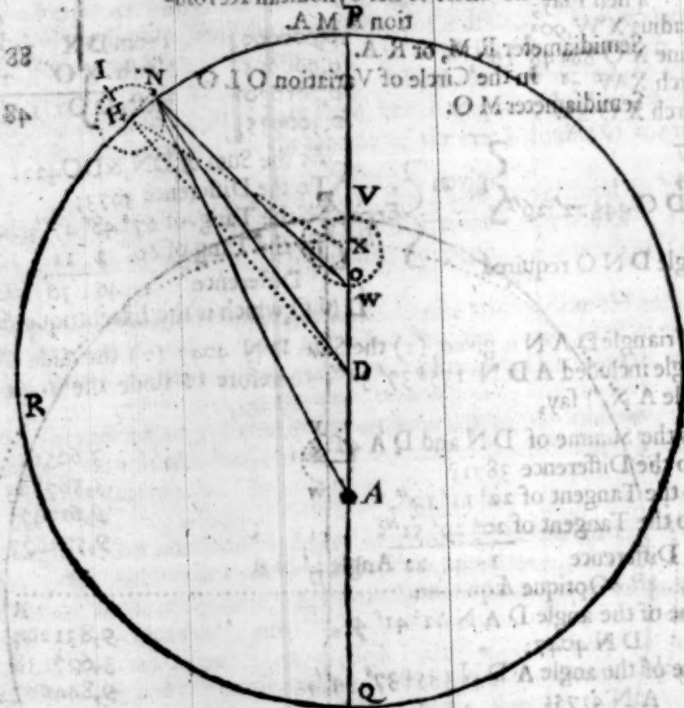
A Geometricall demonstration of the true motion of the Moon with an Investigation of her particular In-aequalities by the Doctrine of Trigonometry.

ANno 1587 August 17: Ho: 19 15′ T A, or $19^h\ 22'\ 30''$ T M, the Moon being, in the Meridian of Uraniburge, Noble *Tycho* observed her in $26^d\ 23'$ of ♊, with Latitude $5^d\ 14'$ South.

For the difference of the Meridian of *London* and *Uraniburge*, is to be substracted 50′, whereby the time in our Meridian is 18ho 32′ 30″, at which time,

	Sig.	D	′	″
The true motion of the Sun is	5	4	5	47
The Distance of ☉ from the Earth	100910			
Middle Motion of the Moon	3	1	3	3
Aphelion of the Moon	1	14	50	59
Node Ascend. A ☾	6	0	6	2
Anomalie of the ☾	1	16	12	4

Figure 1 of the Moon.



In the Excentrique Circle P K Q P, I number the Anomalie of the Excentrique from P to H 46d 12′ 4″, whose Complement 133d 47′ 56″ is the angle H X D, which given, with the two Sides D H 4047, and D X 176, the angle required D H X will be 1d 47′ 56″.

Side D H, 4047,	3,607133
Sine of the angle D X H 133d 47′ 56″;	9,858400
Side D X 176,	2,245513
Sine of the angle D H X 1d 47′ 56″	8,496780

	D	′	″
Simple Anomalie P X H	46	12	47
Angle D H X Substr.	1	47	56
Anomalie æquated P D H	44	24	8
Motion of the Epicycle I H N	88	48	16

In the Triangle D H N.

Summe of D H and H N 4049	3,607348
Difference 4045	3,606919
Tangent of 44d 24′ 8″	9,990938
Tangent of 44 22 26	9,990509

Aggregate	88	46	34	Angle D N H.
Difference		1	42	Angle H D N.

Sine

Sine of the angle H N D 88^{d} 46′ 34″, 9,999900
D H 4047; 3,607133
Sine of the angle N H D 91^{d} 11^{d} 44″, 9,999905
D N 4040: 3,607138

Anomalie æquated P D H	44^{d}	24′	8″
Angle H D N Substr.	1	42	
Anomalie Co-æquated	44	22	26

And because the ☾ is Supra Diacentron, or in the upper part of her Circle, therefore I number the double of the Anomalie æquated 88^{d} 48′ 16″, in the lower semicircle of the Equant, from X to O.

Then I say,
As the Radius X W 90^{d}, 10,000000
To the Sine X O 88^{d} 48′ 16″; 9,999905
So the Arch X W, 2^{d}, 0,301030
To the Arch X O 2^{d}: 0,300935

From D X 176
Substr. X O 2
Rests D O 174

D N 4047
D O 174
Angle N D O 44^{d} 22′ 26″ } given } *Ergo*
Angle D N O required

As the Sum of D N, & D O 4221 3,625415
To the Difference 3873; 3,588047
So the Tang. of 67^{d} 48′ 47″, 10,389524
To the Tang. of 66 2 11 10,352156
Difference 1 46 36 *viz.* Angle D N O, which is the Excentrique Æquation.

In the Triangle D A N is given, (1) the Side D N 4047 (2) the Side D A 176, (3) the angle included A D N 135^{d} 37′ 34″, therefore to finde the angle D N A, and the Side A N, I say,

As the Summe of D N and D A 4223, 3,625621
To the Difference 3871; 3,587823
So the Tangent of 22^{d} 11′ 13″, 9,610475
To the Tangent of 20^{d} 29′ 51″: 9,572677
Difference 1 41 22 Angle D N A Optique Æquation.

Sine of the angle D A N 42^{d} 41′ 4″, 9,831204
D N 4047; 3,607138
Sine of the angle A D N 135^{d} 37′ 34″, 9,844687
A N 4175: 3,620621

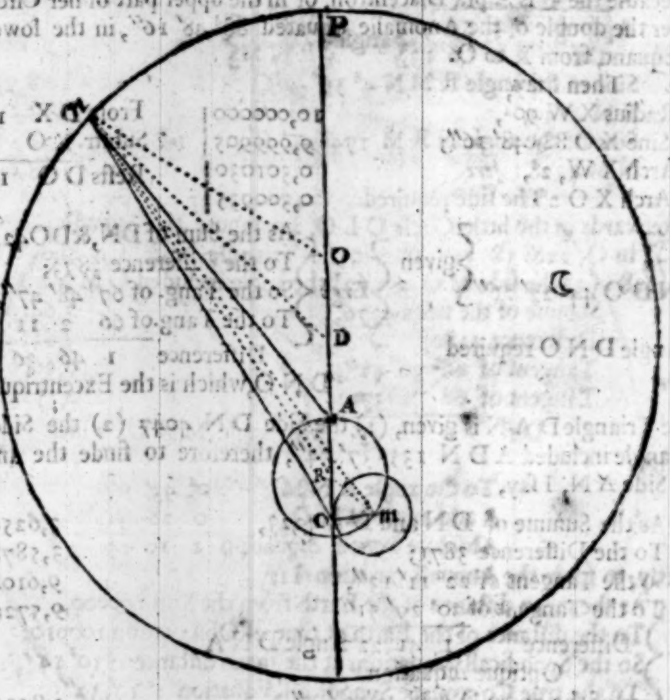
	D	′	″
Excentrique Æquation	1	46	36
Optique Æquation	1	41	22
Absolute Æquation	3	27	58

	Sig.	D	′	″
Middle Motion of the Moon	3	1	3	3
Æquation Substract		3	27	58
Motion of the Moon æquated	2	27	35	5
Motion of the Sun Substract	5	4	5	47
Distance of the Moon from the Sun	9	23	29	18
Synodicall Anomalie	7	16	58	36
	1	12	14	4

Thus is the true place of the Moon obteined from A, the Center of the Earth, as in relation to her own Orbite, wherein she keepeth her proper and uniforme course, by her self about her own Umbilique point. But because the whole Systeme of the Moon is removed from the proper Seats, there ariseth another Inæquality according to the Proportion of her distance from the Sun; for when she is directly in the line which passeth thorow the Center of the Earth to the Sun, she is then freed from this Inæquality, because then the visual line of her appearance, passeth through the Center of

of the ☉, and falleth directly upon the Zodiacall Circle with right angles (as I said before) which is both at the Conjunction and Opposition, but being in, or about her quarters, where she is furthest removed from the said Syzygiacall line, the angle of her Reflection is greatest in respect of the emoved Systeme from the naturall Seats of the other Planets, as before is shewed. Now to finde her Synodicall Æquation, I have set down the following Diagram and Operation.

Second Figure of the Moon.



An Investigation of the Synodicall Æquation of the Moon.

In the premised Diagram we have in the Triangle R A N these three parts given.

1 The Side A N 4175.
2 The Side A R 88.
3 The angle R A N 137ᵈ 18′ 56″.

Hence the other two angles A R N, and A N R, with the Side R N are to be sought.

1

Summe A N and A R 4263,	3,629715
Difference 4087;	3,611405
Tangent 21ᵈ 20′ 32″,	9,591840
Tangent 20 32 10:	9,573570

Aggreg. 41 52 42 } angle { A R N } required.
Dif. 0 48 22 } angle { A N R } required.

2

Sine of angle A R N 41ᵈ 52′ 42″,	9,824483
A N 4175;	3,620621
Sine of the angle R A N 137ᵈ 18′ 56″,	9,831204
R N 4240:	3,627342

The Side demanded.

To the angle A R N 42ᵈ 52′ 42″.
Adding the Angle A R M 133ᵈ 1′ 24″.
Procreate the angle N R M 174ᵈ 54′ 11″.

In

In the Triangle N R M is known.
1 R N 4240.
2 R M 88.
3 angle N R M $174^d\ 55'\ 25''$.

Hence, the other two angles and the 3 side N M are to be sought.

Summe of R N and R M 4328,		3,636287
Difference 4152;		3,618257
Tangent	$2^d\ 32'\ 57''$,	8,648562
Tangent	2 26 44:	8,630532
Aggreg.	4 59 41 } angle { R M N }	
Dif.	0 6 13 } angle { R N M }	
Sine of the angle R M N $4^d\ 59'\ 41''$,		8,939838
R N 4240;		3,627342
Sine of the angle N R M $174^d\ 54'\ 6''$,		8,948731
N M 4328 : *fere.*		3,636235

The side required.

Afterwards in the little Circle O L O, I compute the Synodicall Anomalie from L, by Y, to O, $226^d\ 58'\ 36''$, then in the Triangle N O M is known: (1) the side N M 4328: (2) the side M O 48: (3) the angle included O M N $46^d\ 58'\ 36''$.

Summe of the sides 4376,		3,641077
Difference 4280;		3,631444
Tangent of	$66^d\ 30'\ 42''$,	10,361939
Tangent of	66 2 37:	10,352306

Dif. 0 28 5. *viz.* angle M N O, which is the Synodicall variation.

To the angle A N M	0^d	$42'$	$9''$.
Add angle M N O	0	28	5.
Absolute Synod. Æquation	1	10	14.

Lastly, to finde the Annuall variation. I say,

Anal.	As the mean distance of the Earth from the Sun 100000,	5,00000
	To the distance of the Earth at time of Observation 100910;	5,00393
	So the Synodicall Æquations at the mean distance $1^d\ 10'\ 14''$,	8,31023
	To the true Co-æquate Synodicall Æquation $1^d\ 10'\ 52''$	8,31416

	Sig.	D	′	″
Place of the Moon æquated.	2	27	35	5
Synodicall Æquation Substr.		1	10	52
Place of ☾ in her Orbite.	2	26	24	13
Reduction Substract.				56
True place of the ☾ in the Ecliptique.	2	26	23	17.

Agreeing to the exquisite observation of that tres-noble *Tycho Brahe.* And here I cannot omit to mention that notorious errour of *Th. Lansberg. Precept. 7. Calculi Motuum Cœlest.* where he contends that the true place of the Moon, at the time of this memorable Animadversion, was by the Instruments of *Tycho,* observed in $27^d\ 21'$ Gemini, with South Latitude $5^d\ 13'$, but not in $26^d\ 21'$, or $26^d\ 23'$, as *Tycho* sets down *Lib. 1. Progymnas.* and *Longomont. pag. 123 Astron. Dan.* for saith *Lansberge Fol. 24. Precept. 7.* and *Fol. 6. Theoric. Mot. Cœlest.* the Sun, according to *Tycho,* was in $4^d\ 5'$ ♍, and his Right Ascension $155^d\ 59'$, to which if there be added $291^d\ 15'$, for the measure of time $19^h\ 25'$, it will give the Right Ascension of the *Medium Cœli* $87^d\ 14'$, which, with $5^d\ 13'$ South Latitude, giveth in the Tables of *Regiomontanus,* the true place of the Moon in the Ecliptique, in $27^d\ 21'$ ♊, so that thereby he would prove (though very simply) that *Tycho* failed in his observation, no lesse then a whole deg. or 60′, but let us examine it thus.

K Place

		D	′
Places of the Sun according to *Tycho* ♍.		4	5
Right Ascension of the Sun.		155	59
Distance of the Center of the Moon, Substr.		69	47
Right Ascension of the Center of the Moon		86	12
The Circle Adde,		360	0
	Aggregate	446	12
R: A: ☉ ————	Substr.	155	59
	Rests	290	13

Which $290^d\ 13'$ being coverted into time, sheweth the time of *Tycho's* Observation Ho. 19 21′, and if we enter the forementioned Tables of *Regiomont* under the Signe ♊ with $86^d\ 12'$, and with South Latitude $5^d\ 14'$, we shall finde it to point out in the Ecliptique $26^d\ 21'$ ♊, which was the true place of the ☾ observed by *Tycho*, differing from that, which *Lansberge* falsly wrests to his purpose, a whole degree, but I shall at present omit to mention any more of his absurdities, they that please may read *Phocylides* his *Examen Astronomiæ Lansbergianæ*, where they may finde him sufficiently Characteriz'd.

CHAP. XII.

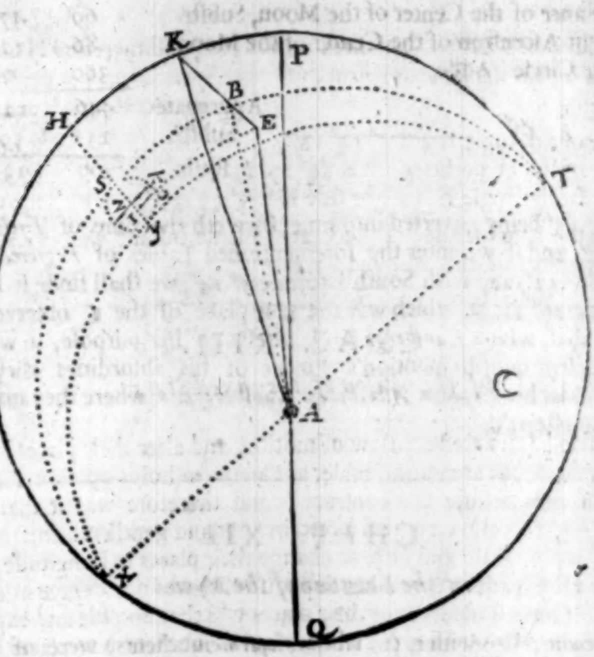
Of the Latitude of the Moon.

THe ancient Astronomers (to whom *Copernicus* assents) were of opinion that the Latitude of the Moon, had onely dependance upon her Nodes, and were always of like magnitude & Quantity in places equally distant from the same, both at the time of her Conjunction, Opposition, and Quarters, but we finde by acurate Observations taken by *Tycho*, and others since his time, that her greatest Latitude in her Quarters is more by 17′, for in the Conjunction and Opposition of the ☉ and ☾, the greatest Obliquity of her Orbe, is always $5^d\ 0'$, but in her Quarters $5^d\ 17'$, which variation is also caused by the Emotion of the ☾ Systeme from the proper Seat, as hath been said before; but for the Inæquality of the motion of the Nodes, which *Tycho* and some of his followers do introduce, I see no reason for it, neither for the Translation of the whole Systeme of the Moon from the Center of the Earth, which *Bullialdus* admits of, his supposition being altogether against reason, and not depending upon sufficient Principles, but I passe over these things, and hasten to practise.

When the Moon is in the Syzygicall line, or line of the ☉, there is no Synodicall Æquation, but her greatest Latitude is alwayes $5^d\ 0'$, but being removed from the said line, her Latitude encreaseth by little and little till she come to be 90^d distant from the ☉, which is her greatest Elongation from the said line, in which Position, her greatest Latitude is $5^d\ 17'$. So that the Excesse, or augmentation of her Latitude is 17′, as we shall here demonstrate.

Third

Third Figure of the Moon.



In the Diagram premised TKXP, represent the Orbe of the Moon, TSX the Plane of the Ecliptique, X, the Node Ascending, T the Node discerting, H S the greatest Latitude of the Moon in her Conjunctions, and Oppositions, 5d 0′, and H Y, the greatest Latitude in her Quarters 5d 17′, the Excesse S Y, 17′, and here you are to note that when she is placed in either of her Nodes, (which are nothing but the Intersections of her Orbite with the Ecliptique) she is void of Latitude, but departing from the same her Latitude augments, till she commeth to the limits of her greatest Latitude. Now suppose the ☾ being New, or Full be distant, from her South Node T, 86d 17′ 15″, and her Latitude be required, therefore I number the Argument of her Latitude from T, by P, to K, 86d 17′ 15″, and from thence, let fall the Perpendicular K B, upon T B, the Ecliptique, with Right angles; then in the Sphæricall Rectangle Triangle T B K, we have known: (1) the Side or Hypothenuse T K 86d 17′ 15″: (2) the angle K T B 5d 0′: Hence, the Side B K, or angle B A K, which is the angle of her Latitude, may be obteined.

Anal.	Radius 90d,	10,000000
	Angle KTB 5d 0′;	8,940296
	Hypothenuse T K 86d 17′ 15″,	9,999087
	Sine B K 4d 59′ 22″:	8,939383

Or angle of her Latitude B A K.

When she is Extrasyzygiacall,

Anno 1587, August 17. Ho. 18 32′ 36″ (in our Meridian) being the time beforementioned, *Tycho* observed the true Latitude of the ☾, to be 5d 14′ South, at which time her Synodicall Anomalie is 226d 58′ 36″. Likewise the greatest Latitude of the Moon new or full, understood by the angle H T S, is 5d 0′, and her greatest Latitude, when she is in her Quarters, shewed by the angle H T Y, is 5d 17′, the halfe difference S Z is 8′ 30″, with which Intervall on the Center Z, is described a little Circle, noted with S O Y S, wherein I number the Synodicall Anomalie, from S (by Y) to O 226d 58′ 36″, and because its greater then 180d, and lesse then 270d, I deduct it from 270, and there remains 0 43 1′ 24″, then the Analogie is,

As the Radius Z Y 90^d,	10,000000
To the Sine Z I 43^d 1′ 24″;	9,833973
So the Arch Z Y 8′ 30″,	7,393145
To the Arch Z I, 5′ 48″:	7,227118

Which added to S Z 8′ 30″, maketh S I 14′ 18″, and therefore H S I is 5^d 14′ 18″ then the Analogie is the same as before.

Radius 90^d,	10,000000
Sine of the angle K T I 5^d 14′ 18″;	8,960470
Sine of the Hypothenuse P K 86^d 17′ 15″,	9,999087
Sine of the angle E A K, or side K E 5^d 13′ 39″:	8,959557

Therefore the true Latitude of the ☾ at the same instant was 5^d 14′ *fere*, agreeing to the Observation of the admired *Tycho*.

CHAP. XIII.

Of the motion of the fixed Stars.

THe fixed Stars are very slow of motion, and alter their places but little in many yeares, but are immoveable, as *Copernicus* holds opinion, for Observations in all ages testifie the contrary, and therefore was it that *Ptolomie* and the Ancients allowed them a certain Lent and gentle motion in consequence of the Signs, and by little and little to change their places in Longitude, which according to their Observations (or rather Suppositions) was one degree in 100 yeares, or thereabouts. The first observer of their places was that notable and expert Mathematician *Hypparchus*, who with great labour, found out their true places, and composed new Tables of their motions.

After him followed *Ptolomie*, who in some things corrected the Catalogue of his prædecessor *Hypparchus*, and changed some of their names, as he witnesseth, *Lib.* 7 *Cap.* 4. *Almagesti*, where he alledgeth severall reasons for his so doing.

About 740 years after flourished *Albategnius*, in all which time, namely from *Ptolomie* to *Albategnius*, there is none known, that observed the fixed Stars and their motions, but the last age produced more admirable and rare discoveries then any had done before; to passe by the worthy *Copernicus*, *Walther*, *Vernerus*, and the magnificent Prince, the Lantgrave of *Hassia*, all who made many admirable Observations, yet at length appeared that noble man of *Denmarke*, *Tycho Brahe*, who to the glory of Art, put a Crown upon the work, insomuch that by his incredible pains, and vast expence of Treasure, he by his admired observations,compiled that acurate Catalogue of the fixed Stars, which next to the motion of the Sun, is the best foundation to restore Astronomie.

To passe by the *Chimera's* of *Alphonsus* and others, and the absurd supposition of *Thebith Benchore* (who attributeth to the fixed Stars a motion, sometime in consequence, and sometime in antecedence of the Signes) I next come to *Copernicus*, who admitteth of an inæquality of motion in the fixed Stars, and though taking away those absurdities of their going backward, yet neverthelesse falleth (in my opinion) into another almost as bad; for he would have the Poles of the Earth to wheel about the Poles of the Zodiaque in the space of 25816 Egyptian years, whereby the motion of the fixed may sometime be augmented, and sometime again diminished, from which Inæquality ariseth the inæquall motion of the Præcession of the Equinoctiall, and of the motion of the Planets and Stars, which *Copernicus* introduceth.

But the late learned and worthy Frenchman, *Ismael Bullialdus* dissents from *Copernicus*, who maketh the motion of the Stars inæquall, by the recesse of the Equinoctiall Points in antecedence, and by the turbination of the Poles of the Earth: against which inæquality, *Bullialdus Lib.* 5 *Cap.* 2. giveth severall Reasons, some whereof I shall here give you. (saith he)

"First, there are no observations of the ancient Astronomers, that exactly determines

„ mines the places of the fixed Stars, and there having so bad a foundation, it
„ would be meer rashnesse in any, to build up any such fabrick of turbination.

„ Secondly, No Circular Revolution in the Heavens throughout its whole Cir-
„ cumference, doth admit of more Inæqualities then one, where in the own semi-
„ circle the motion is retarded, in the other encreased: but admitting of this Inæ-
„ quality, (which *Copernicus* attributes,) the simple motion is almost fifteen times in-
„ tended and remitted, but in other Revolutions intended but once and remitted no
„ oftner.

„ Thirdly, so small a difference of the motions of the fixed Stars is there found
„ in distinct Intervalls of time, that it cannot be attributed to any true and naturall
„ motion, but with great boldnesse and temerity, whereby too unadvisedly, we fa-
„ sten upon the Heavens, the fictions of our own frail and imperfect Intellect.

The other reasons which *Bullialdus* bringeth against this fained Inæquality, I do here omit, these being sufficient to evince the contrarie, I now come to make a Collation of ancient and modern observations.

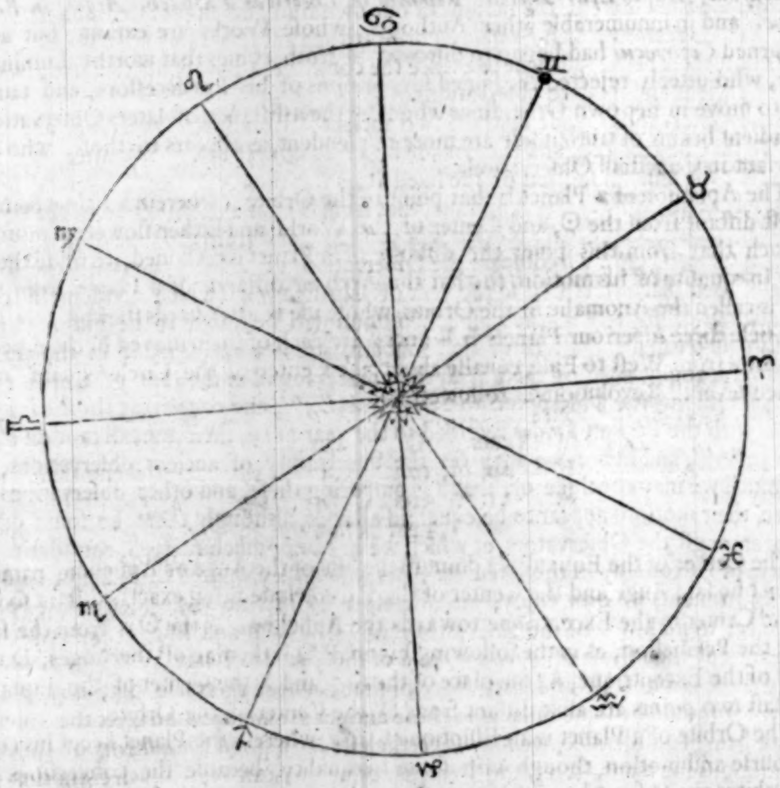
If the Observations made by those two ancient Astronomers *Timocharis* and *Hipparchus* may be credited, and those made by *Ptolomie* neer 400 years after, we shall finde that the annuall motion of the fixed Stars was then 52″ 32‴, likewise by the observations of *Albategnius* it appears, that from the time of *Ptolomie* to the time of his observations, their yearly motion was 50″ 26‴, and from the time of *Ptolomie* to *Tycho* 50″ 37‴, yet if we compare the Observations of *Albategnius* with the Catalogue of their places rectified to the year of Christ 1364 (which accidentally came to the hands of *Bullialdus*) their annuall motion will be found to be but 48″ 52‴. Again taking the observations of the Arabian, *Ibennezophim*, made in the year of Christ 937, and comparing them with their places found in the year of Christ 1364, their annuall motion will appear to be onely 45″ 5‴, and conferring those of *Albategnius* with the Persian Tables rectified to the year 1115, their annuall motion ought to be 52″ 7‴, and hence we may see the uncertainty of ancient observations, yet thus much we may conclude of, that by comparing these, and other observations together, their motions appear to be equall in all ages, although there be some discrepancy amongst the Observators, at which we need not much marvell, considering the infancie of Astronomy in those remote Ages, when they wanted those helps, and curious Instruments we now enjoy, and therefore to rectifie their motions, I hold it most meet to make use of the observations of *Tymecharis* and *Hypparchus* (which are more ancient then those of *Ptolemie*) and of those made of late by *Tycho Brahe*, in regard there is a notable and large space of time between them, so that notwithstanding there should be some fallacie in those ancient Animadversions, yet the Intervall of time being considerable; we may neverthelesse lay a good foundation of their annual motions for many suceeeding Centenaries, neither can I vary much from that proportion that *Tycho* and *Bullialdus* have alotted before me, being about 50″½, which quantity I retein, as most agreeable to Truth and Observation.

The motion of the fixed Stars being by observation found to be equall, it follows then, that the Points both of the middle and true motion (which are called Umbilique Points) must needs be united and fall together in the very Center of the Orbe, as you may behold in the following Figure, so that the Orbe of the fixed Stars is not excentricall, but concentricall to the Sun.

But the variation of the Latitude of the fixed Starres is not so perceptable and easie to be discovered, and found out, as their Longitude, in regard there is no sensible variation in many hundred years, yea if wee confer the observations of *Tycho*, with those taken by *Ptolomie* 1500 years since we may in some Observations finde a little difference, but a contradiction in others, so that we can gather nothing from the help of former observations to be sufficient, whereupon to establish and rectifie this mutation of their Latitudes, when as they seldome took their places neerer then to the fourth part of a degree nay many times failed a degree from truth, and then if we do but consider the small difference of mutation, which is found in distinct Intervalls of time, it will appear but meer rashnesse and presumption in any that shall attempt to make a restitution of this variation of their Latitudes; for my part I conceive

ceive the Revolution and Period thereof, cannot be foreseen by man, but is onely known to God alone, yet thus much I may adde, that so many fixed Stars as there are in number, so many severall Latitudes and Inclinations have they, which questionlesse vary, and are of the same quality and nature with those of the inferiour Orbes, though differ much in quantity and proportion. It being then superfluous to adde any Theorie of their particular Deviations from the Ecliptique Orbe, I shall onely content my self with those Observations made in our age by the never to be forgotten *Tycho Brahe*, and therefore I refer the Reader to his Catalogue of their places, which I have inserted in its proper place.

A Figure of their motions in Longitude.



CHAP. XIV.

Of the Theorie and motions of the three superiour Planets, Saturne, Jupiter, *and* Mars.

1 The reason why we call the three Planets ♄ ♃ and ♂ (in this new forme of Astronomy) Superiours, is because they are placed above, or without the great Orbe of the Earth, as ♀ and ☿ are called Inferiours, because they are placed under, or within the Orbe of the Earth towards the Center, that is to say between the Earth and the Sun, who is the Center of the whole Planetarie Systeme.

2 These three Planets (contrarie to the motion of the Earth) are usually accounted to have a twofold, or double motion, the one of Longitude, the other of Latitude, for as the way of the ☉ (for so I it call in respect of the vulgar opinion) is oblique to the Equator, so are the ways of these Planets oblique to the way of the ☉, therefore in its proper place I shall describe their motion in Longitude, with the inclinations of their

their Orbits from the Ecliptique, beginning first with their motions, as in respect of Longitude, which is in consequence of the Signes *ab occasu in Ortum*, or from West to East. And whereas to us that live upon the surface of the Earth, their motions appear very unequall and irregular, being to the eye sometime direct, sometime retrograde, and sometime stationarie; therefore to salve the Phenomena, the ancient Astronomers, ignorant of the Earths motion, were forced to devise other helps, for besides the Excentrique motion, they imagined each Star had also a peculiar motion in an Epicycle, whose Center they supposed to be carried in the Circumference of the Excentrique, and so by help of a multiplicity of Circles and contrary motions (though altogether against reason and nature) they came somewhat neer to discover the Phenomenan, as may appear by *Ptolomie Lib. 3. 4. 5, &c. Almagests, Purbachius in Lib. Theoricarum, Mæstin Epit. Astron. Reinhold in Theoricas Purbach. Argol. in Pand. Sphæric.* and in innumerable other Authours, whose Works are extant; but after the learned *Copernicus* had begun to discover the truth, comes that worthy Luminarie *Kepler*, who utterly rejected the fained suppositions of his Prædecessors, and taught truth to move in her own Orbe, since whom by the assistance of later Observations, the Radient beams of truth it self are more resplendent, as appears to those, who are conversant in Cœlestiall Observations.

3 The Aphelion of a Planet is that point of the Orbite, wherein a Planet being is furthest distant from the ☉, and Center of the World, and is then slowest in motion, insomuch that from this point the distance of a Planet is reckoned, to finde thereby the Inæquality of his motion, so that the Arch or distance of a Planet from this point, is called the Anomalie of the Orbite, whose use is afterwards shewed.

4 These three superiour Planets ♄ ♃ and ♂ are each of them moved in their peculiar Orbites from West to East, equally about the Center of the Circle equant, making their severall Revolutions as followeth.

	Years	D.	Ho.	′
♄	29	174	4	58
♃	11	317	14	49
♂	1	321	23	32.

5 The Center of the Equant is a point in the line of the Auge or Aphelion, namely between the said Auge, and the Center of the Excentrique being exactly distant so far from the Center of the Excentrique towards the Aphelion, as the ☉ is from the said Center the Perihelion, as in the following Figure P Q is the line of the Auges, D, the Center of the Excentrique, A, the place of the ☉, and X the Center of the Equant, which last two points are alike distant from D, the Center of the Orbite.

6 The Orbite of a Planet is an Elliptique Circle, wherein the Planet keeps his constant course and motion, though with some Inæquality, because the conversions of their Orbites are observed not to be æquated to their own Centers, but to the Center of the Circle Equant, which point is marked in the following Figure with the letter X, the Semidiameter and motion thereof being equal to the Semidiameter and motion of the Epicycle.

7 Upon the Center Equant is described the Circle Equant, whose circumference is noted with the letters V W V, which serveth chiefly to finde the variation of the first Inæquality, for in the Diameter thereof V X W is numbred the variation from the Center X, (which is the point of æquality) upwards towards V, when a Planet is Infra Diacentron, but on the contrary, it is accounted downwards when a Planet is Supra Diacentron, the motion thereof being double to the motion of the Planet in his Orbite.

8 Because the Center of the Equant is towards the Aphelion, or Auge of the Excentrique, it necessarily followeth that a Planet moveth more slowly when he is Supra Diacentron, or in the upper part of his Orbite, and more swift when he is Infra Diacentron, or in the nether part thereof, for a lesser part of the Orbite belongeth to the upper part of the Circle Equant, and a greater part is due to the nether part thereof, as the following Figure plainly demonstrates.

9 Upon the point D, is described the Excentrique, which is a pricked Circle, whose Circumference serves to carry the Center of the Epicycle, marked with the letter

ter Z, in the Perimeter of which Epicycle is numbred the double of the Anomalie æquated from L, which serveth to finde out the true place of a Planet in his Elliptique, and his distance from the Sun, for when a Planet is either in his Auge, or opposite Auge he is found in the point L, but when he is Diacentron he is in the point N, and is then neerest the Center of his Excentrique.

10 The Excentrique place of a Planet is shewed by a right line drawn from D the Center of the Orbite, to the place of the Planet, as in the third Figure following is shewed by the line D N, so that the Æquation of the Excentrique is the angle D N O being equall to the angle T N R.

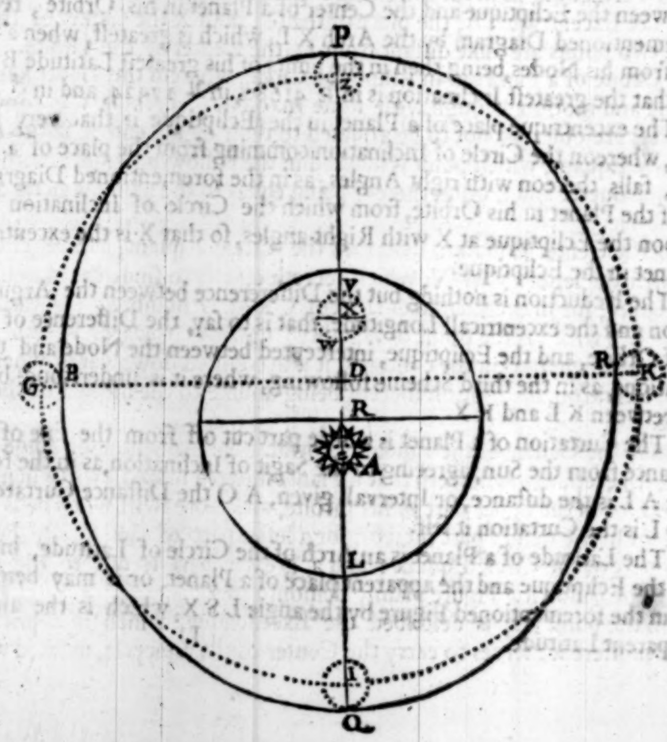
11 The place of a Planet from the Sun is shewed by a right line drawn from A the Suns place, through N the Planet to the Ecliptique, as in the said third Figure following is represented by the line A N, so that the Optique Æquation is equall to the angle A N D.

12 To finde the Excentrique æquation their must be known, (1) the motion of the Aphelion, (2) the distance of a Planet from his Aphelion, (3) the quantity of the bi-sected Excentricity; the same are also given, to finde the Optique Æquation, onely that part of the bi-sected excentricity conteined between the Center of the Excentrique and the body of the Sun, whereas in finding the Excentrique æquation that part is used which is comprehended between the Center of the Circle Excentrique, and the Center of the Equant, being corrected by the variation thereof.

13 The absolute Æquation is the Aggregate or Summe of the Excentrique and Optique Æquations, and therefore we call it the Compound and Absolute Æquation, or Prosthaphæresis of the Orbite.

14 In regard the Earth is one of the Planets, and is placed far without the Center of the World, it from thence followeth, that the true place of a Planet from the Earth, is shewed by the visuall line passing from the Center of the Earth, through the body of the Planet to the Ecliptique, so that the Angle of this second Inæquality is to be understood in the third Figure following, by the Angle A N S, which Angle is least in Saturn, greater in Jupiter, and greatest of all in Mars, which is caused by their unequall distances from the Earth.

15 To compute the true place of a Planet from the Earth, the Parallax of the Earths Orbe is to be known, to finde which these three parts are to be given, (1) the Distance of a Planet from the Earth, (2) the Distance of the Earth from the Sun, (3) the angle included, which is the Distance between the place of the Earth, and place of a Planet from the Sun.



In

In the premised Scheme, the outermost Ellipsis represents the Orbite of ♄ ♃ or ♂, whose Center is marked with the letter D, and the Diametrall line of the Auges, with the letters P D Q, passing from P the place of the Aphelion, to Q the place of the Perihelion, which line exactly bi-sects the Orbite into two semicircles, equall in the Quantity and Celerity of the same parts.

The innermost Ellipsis marked with the letters S Y L T, is the Orbite of the Earth, the Center whereof is noted with R, by which the Diametient line passeth from S, the Aphelion, to L, the Perihelion.

A Table of the particular Dimensions of the severall Orbites of Saturn, Jupiter, Mars, and the Earth.

	♄	♃	♂	Earth
Semidiameter of the Circle D Z or D G.	952500	522000	152040	100000
Semidiameter of the Epicycle Z P, or B G.	790	320	460	16
Wch equalizeth XV, or XW in the Equant	790	320	460	16
Bi-sected Excentricity D X, or D A.	54800	25230	14105	1787
In the Ellipsis.				
Aphel. Semidiametient D P equal to D Q.	953290	522320	152500	100016
Diacentron Semidiametient D B, or D R.	951710	521680	151580	99984

16 The Nodes are two Points in which the Plane of the Ecliptique intersects the Orbite of the Planet in places opposite by the Center of the Sun, as in the third figure following, where T E K represents the Plane of the Orbite, and T X K the Plane of the Ecliptique, which intersect each other in the points T, and K, opposite by A, the Center of the ☉.

17 The Argument of Inclination is an Arch of the Orbite intercepted between the Node Ascending, and the place of a Planet from the Sun, being numbred in consequence of the Signes, as in the third figure following, K is the Node Ascending, L the place of the Planet, therefore K L is called the Argument of Inclination.

18 The Circle of Inclination is a great Circle about the Sun in the Sphære of the fixed, falling right upon the Ecliptique.

19 The Inclination of a Planet is an Arch of the Circle of Inclination comprehended between the Ecliptique and the Center of a Planet in his Orbite, represented in the forementioned Diagram by the Arch X L, which is greatest, when a Planet is 90d distant from his Nodes, being then in the limits of his greatest Latitude B E, and here note, that the greatest Inclination is in ♄ 41680, in ♃ 12424, and in ♂ 496.

20 The excentrique place of a Planet in the Ecliptique is that very point of the Orbite, whereon the Circle of Inclination comming from the place of a Planet in his Orbite, falls thereon with right Angles, as in the forementioned Diagram, L is the place of the Planet in his Orbite, from which the Circle of Inclination passeth, and falls upon the Ecliptique at X with Right angles, so that X is the excentrique place of the Planet in the Ecliptique.

21 The Reduction is nothing but the Differerence between the Argument of Inclination and the excentricall Longitude, that is to say, the Difference of the two Arches of Orbite, and the Ecliptique, intercepted between the Node and the Circle of Inclinations, as in the third Scheme following, where it is understood by the Difference between K L and K X.

22 The Curtation of a Planet is a little part cut off from the line of his Intervall or distance from the Sun, agreeing to the Sagit of Inclination, as in the forementioned Figure A L is the distance, or Intervall given, A O the Distance Curtated, and therefore O L is the Curtation it self.

23 The Latitude of a Planet is an Arch of the Circle of Latitude, intercepted between the Ecliptique and the apparent place of a Planet, or it may better be understood in the forementioned Figure by the angle L S X, which is the angle it self of the apparent Latitude.

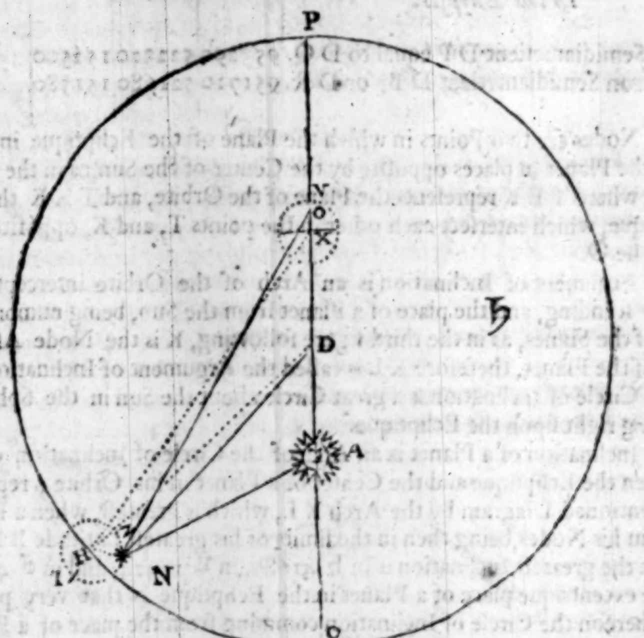
CHAP. XV.

A Geometricall Demonstration of the true motion of Saturn, Jupiter, *and* Mars; *according to the Doctrine of Trigonometrie.*

ANno 1587 January 15 at 4^{ho} 55′ (*Meridiano Londinensi*) noble *Tycho* observed in ♄ in 26^{d} 24′ ♈, having 2^{d} 25′ South Latitude, at which time is given,

	S	D	′	″
The true place of the ☉.	10	5	22	21
The Distance of ☉ from the Earth.	98455			
Middle motion of ♄.	1	7	37	41
Aphelion of ♄.	8	25	41	19
Node Ascend. ♄.	3	20	24	5
Aomalie of ♄.	4	11	56	22.

First Figure of Saturn.



A Synopsis of the Calculation.

In the Excentrique Circle, P H Q P, I compute the Anomalie of the Excentrique from P, the Aphelion, to H, 131^{d} 56′ 22″, whose Complement is the angle D X H 48^{d} 3′ 38″, which given, we have in the Triangle D X H, two other parts, namely D H 952500, and D X 54800. Hence the angle D H X will be found to be 2^{d} 27′ 10″ for,

As the Side D H 952500,	5,978865
To the Sine of the angle D X H 48^{d} 3′ 38″;	9,871486
So the Side DX 54800,	4,738781
To the of the angle D H X 2^{d} 27′ 10″:	8,631402

Simple Anomalie P X H.	131^{d}	56′	22″
Angle D H X, Substr.	2	27	10
Rests Anomalie æquated.	129	29	12
Motion of the Epicycle I H N	258	58	24

In

In the Triangle D H N.

I

Summe of D H, and H N 953290,	5,979225
Difference 951710;	5,978505
Tangent of 50ᵈ 30′ 48″,	10,084102
Tangent of 50 28 0:	10,083382

Aggregate. 100 58 48. *viz.* Angle H N D.
Difference. 0 2 48. *viz.* Angle H D N.

II

Sine of the angle H N D 100ᵈ 58′ 48″,	9,991976
Side D H 952500;	5,978865
Sine of the angle N H D 78ᵈ 58′ 24″,	9,991906
Side D N 952346:	5,978795

	D	′	″
Anomalie Æquated P D H.	129	29	12
Angle H D N, Adde,		2	48
Co-æquate Anomalie P D N	129	32	0

In this Example ♄ is Infra-Diacentron, therefore I reckon 78ᵈ 58′ 24″ (being equall to the Angle Z H N in the Epicycle) in the upper Semicircle of the Equant from X towards V, *viz.* to the point O.

Then say,

As the Radius X V 90ᵈ,	10,0000000	To D X	54800
To the Sine X O 78ᵈ 58′ 24″;	9,991907	Adde X O	775
So the Arch X V 790,	2,897627	D O	55575
To the Arch X O 775:	2,889534		

In the Triangle D N O.

D N 952346	given	As the Sum of D N & D O 1007921,	5,003426
D O 55575		To the Difference 896771;	4,952681
Angle N D O 129ᵈ 32′ 0″		So the Tangent of 25ᵈ 14′ 0″,	9,673274
		To the Tangent of 22 44 55	9,622529

Angle D N O required: Difference 2 29 5 *viz.* Angle D N O, which is the Excentrique Æquation.

Then in the Triangle D A N is given, (1) the Side D N, *952346*, (2) the side D A 54800, (3) the angle included A D N 50ᵈ 28′ 0″, then to finde the Angle D N A, and the side A N, I say,

As the Sum of D N & D A 107146,	5,003093
To the Difference 897546;	4,953054
So the Tangent of 64ᵈ 46′ 0″,	10,326725
To the Tangent of 62 7 44:	10,276686

Dif. 2 38 16. *viz.* Angle D N A, which is the Optique Æquation.

Sine of the angle D A N 126ᵈ 53′ 44″,	9,902943
Side D N 952346;	5,978795
Sine of the angle A D N 129ᵈ 32′ 0″,	9,887193
Side A N 918427:	5,963045

	D	′	″
Excentrique Æquation.	2	29	5
Optique Æquation.	2	38	16
Absolute Æquation.	5	7	21.

	S	D	′	″
Middle Motion of ♄	1	7	37	41
Æquation Substract.		5	7	21
Motion of ♄ from ☉ in his Orbite.	1	2	30	20
Node Ascend. of ♄ Substract.	3	20	24	5
Argument of Inclination.	9	12	6	15
Whose Complement to the Circle is	2	17	53	45

To Calculate the Reduction, I say,

As the Radius 90d,	10,000000
To the Co-sine of the greatest Inclination of ♄ 2d 30′ 30″;	9,999584
So the Tangent of the Compl. of his Inclination 77d 5 ′ 45″,	10,668658
To the Tangent of the Argument reduced 77d 53′ 3″:	10,668242

Whose difference 0′ 42″ is the Reduction required. And here note that the greatest Reduction of ♄ is 1′ 41″, which happeneth when he is 45d distant from his Node; therefore (doubling the Argument of Inclination) the Analogie may be thus.

As the Radius 90d,	10,000000
To the greatest Reduction 1′ 41″;	6,689714
So the Sine of 24d 6′ 15″,	9,612843
To the Reduction required 42″, as before:	6,302557

Note,

If a Planet depart or move from either Node towards the Limits of his greatest Latitude, the Reduction is to be substracted from the place found in the Orbite, but if he depart from the Limits, and approach towards the Nodes, the Reduction is to be added, for so the Summe or difference will be the place in the Ecliptique.

As in our Example ♄ is past the Limit of his greatest Latitude, and is approaching towards his Node, therefore the Reduction is to be added.

	S	D	′	″
Place of ♄ from ☉ in his Orbite.	1	2	30	20
Reduction Adde.				42
Place of ♄ from ☉ in the Ecliptique.	1	2	31	2
Which deducted from the ☉ place.	10	5	22	21
Leaveth the Anomalie of Commutation.	9	2	51	19

To finde the Inclination of his Orbite from the Ecliptique, represented in the second Figure following by the line X L.

In the Sphæricall Triangle X K L, is given, (1) the Hypothenuse X L, the Argument of Inclination 77d 53′ 45″, (2) the greatest Inclination E B 41680 (understood by the angle X K L) then the Proportion is.

As the Radius K E 90d,	10,000000
To the greatest Inclination E B 41680;	4,619928
So the Sine of K L 77 53′ 45″,	9,990236
To the Side X L 40753:	4,610164

Which is the Inclination agreeing to the Common Radius 952500, but whereas the distance of ♄ from the ☉ 918427, is to be put for the Radius, X L will be but 39296. For,

As D L 952500,	5,978865
To A L 918427;	5,963045
So L X 40753,	4,610164
To L X 39296:	4,594344

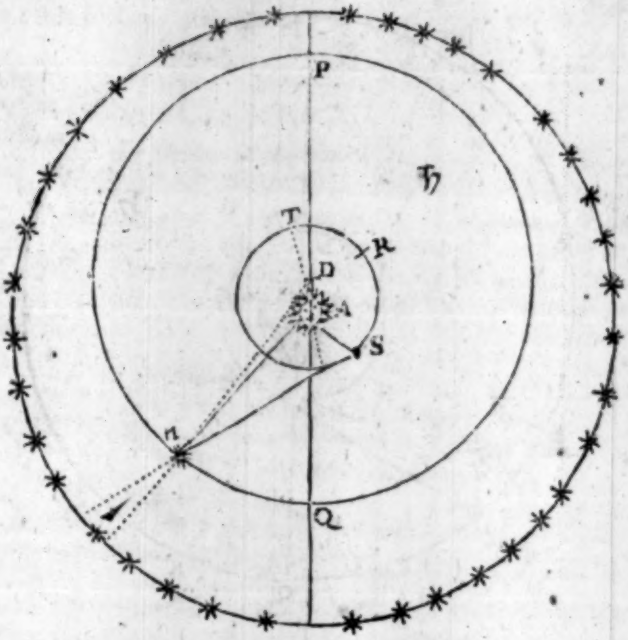
The Distance of ♄ in his Orbite from the Sun being given, with the Inclination of his Orbite from the Ecliptique, the Distance corrected by Curtation may thus be found.

In the second Figure following.

Hypothenuse A L 918427	Summe	957723	——	5,981239
Inclination X L 39296	Difference	879131	——	5,944053
		Aggregate		11,925292
Distance of ♄ Curtated A X 917585.		Semiaggregate		5,962646.

Second

Second Figure of Jupiter.



Of the second Inequality of Saturn, *arising from the Annuall motion of the Earth.*

At the time of this Observation the true place of the Sun from the Earth is $10^s\ 5^d\ 22'\ 21''$, and his Distance from the Earth 98455, which known, we have in the Triangle A N S of the premised Diagram three parts given.

1 A N 917585
2 A S 98455
3 Angle N A S $92^d\ 51'\ 19''$ } given.

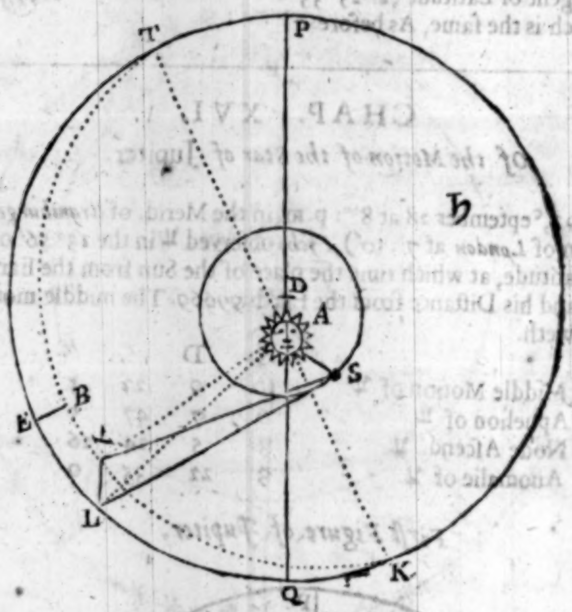
Angle A N S required.

Sum of A N, and A S 1016040,	6,006911
Difference 819130;	5,913353
Tangent of $43^d\ 34'\ 20''$,	9,978346
Tangent of 37 29 16:	9,884788

Dif. 6 . 5 4 *viz.* A N S, Which is the Parallax of the Earths Orbe, or the Difference, which is the Difference between the true place at A, and the apparent at S, the Earth being here at the time of his Observation to be substracted from the place seen from the Sun.

	D	′	″	
Place of ♄ from ☉ in the Ecliptique.	2	31	2	♉
Parallax of the Earths Orbe Substr.	6	5	4	
True place of ♄ from the Earth.	26	25	58	♈.

Third Figure of the Saturn.



To finde the Distance of Saturn from the Earth.

Analogie.	Sine of the angle A X S 6d 5′ 4″,	9,025281
	Side A S 98455;	4,993238
	Sine of the angle X A S 92d 51′ 19″,	9,999460
	Side S X 927721:	5,967417

To finde the apparent Latitude of Saturn from the Earth.

In the Triangle of the former Diagram X L S, the sides are given, *viz.* S X 927721 X L 39296, and the angle L S X is sought, therefore the Analogie is.

As the Side X S 927721,	5,967417
To the Side X L 39296;	4,594344
So the Radius 90d,	10,000000
To the Tangent of the angle X S L 2d 25′ 32″:	8,626927

And because ♄ is going from his Node Descending T, and is past the Limit of his greatest Latitude, and approacheth towards his Node Ascending, therefore his Latitude is 2d 25′ 32″, South Descending.

To finde the apparent Latitude of Saturn otherwise.

In the preceding Diagram, the greatest Inclination of the Orbite of ♄ B E is 2d 30′ 20″ (which in our Dimensions answers 41680 parts) which known, the Inclination of the intermediate parts of his Orbite may be gotten, and consequently his Latitude.

Radius K E 90d,	10,000000
Sine of the angle X K L 2d 30′ 30″;	8,641124
Sine of K L 77d 53′ 45″,	9,990236
Sine of X L 2d 27′ 9″:	8,631360
Which is the Inclination.	

Sine

Sine of Elong. ♄ from ☉ $81^d. 3' 37''$,	9,994692
Sine of the Anom. of Commutation $92^d\ 51'\ 19''$;	9,999461
Co-tangent of Inclination $2^d\ 27'\ 9''$,	11,368223
Co-tangent of Latitude, $2^d\ 25'\ 33''$:	11,372992

Which is the same, As before.

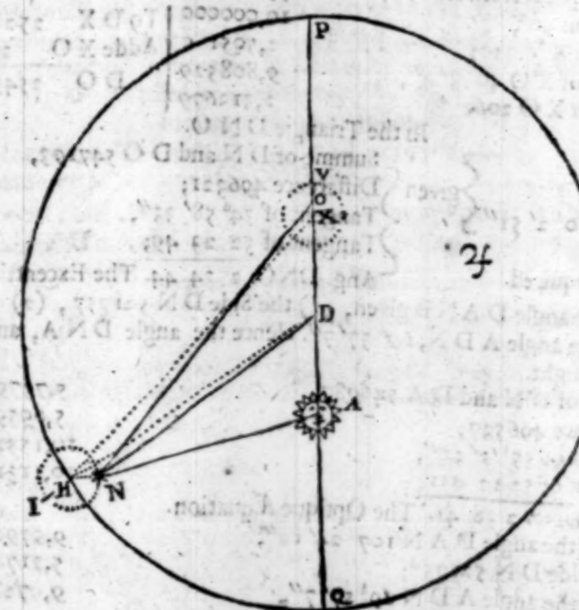
CHAP. XVI.

Of the Motion of the Star of Jupiter.

ANno 1593, September 28 at 8^{ho}: p. m. in the Merid. of *Uraniburge*, (but in the Meridian of *London* at $7^h. 10'$) *Tycho* observed ♃ in the $13^d\ 56'$ of ♑, with $29'$ South Latitude, at which time the place of the Sun from the Earth is $15^d\ 18'\ 23''$ ♎, and his Distance from the Earth 99669. The middle motions of ♃ being then as followeth.

	S	D	′	″
Middle Motion of ♃.	10	0	22	5
Aphelion of ♃.	6	7	47	5
Node Ascend. ♃.	3	5	24	26
Anomalie of ♃.	3	22	35	0

First Figure of Jupiter.



A Synopsis of the Calculation.

In the premised Diagram (fitted to the middle motions given) the Anomalie of ♃ $3^s\ 22^d\ 35'\ 0''$, is numbred from P to H, namely understood by the angle P X H, which known, we have in the Triangle X D H, three parts given, (1) the Side D H 522000, (2) the side D X 25230, (3) the angle D X H $67^d\ 25'\ 0''$. The angle DHX being required.

Side D H 522000,	5,717670
Sine of the angle D X H $67^d\ 25'\ 0''$;	9,965353
Side D X 25230,	4,401917
Sine of the angle D H X $2^d\ 33'\ 28''$:	8,649600

Simple

	D	′	″
Simple Anomalie P X H.	112	35	0
Angle D H X Substr.	2	33	28
Anomalie Equated P D H.	110	1	32
Motion of the Epicycle I S N	220	3	4.

In the Triangle D H N.

Summe of D H, and H N 522320,	5,717937
Difference 521680;	5,717404
Tangent of 69d 58′ 28″,	10,438332
Tangent of 69 57 7:	10,437799

Ergò, { Angle H N D 139 55′ 35″. Angle H D N 0 1 22. }

Sine of the angle H N D 139 55′ 35″,	9,808731
Side D H 522000;	5,717670
Sine of the angle N H D 40d 3′ 4″,	9,808529
Side D N 521757:	5,717468

	D	′	″
Anomalie equated P D H.	110	1	32
Angle H D N Adde.		1	21
Anomalie Co-æquated P D N	110	2	53.

♃ being found in the Diagram to be Infra-Diacentron, I therefore account the Excesse of the motion of the Epicycle above 180d, viz. 40d 3′ 4″, in the higher semicircle of the Equant from X to O, then I say,

As the Radius 90d,	10,000000	To D X	25230.
To the Arch X V 320;	2,505150	Adde X O	206
So the Sine of X O 40d 3′ 4″,	9,808529	D O	25436
To the Arch X O 206:	2,313679		

In the Triangle D N O.

D N 521757	given	Summe of D N and D O 547193,	5,738139
D O 25436		Difference 496321;	5,695762
Angle N D O 110d 2′ 51″.		Tangent of 34d 58′ 33″,	9,844836
		Tangent of 32 23 49;	9,802459
Angle D N O required.		Ang. DNO 2 34 44 The Excentrique Æquat.	

Also in the Triangle D A N is given, (1) the Side D N 521757, (2) the Side D A 25230, (3) the angle A D N, 69d 57′ 7″. Hence the angle D N A, and the Side A N are to be sought.

Summe of D N and D A 546987,	5,737982
Difference 496527;	5,695947
Tangent of 55d 1′ 26″,	10,155159
Tangent of 52 12 45:	10,113124
Angle D N A 2 38 41. The Optique Æquation.	
Sine of the angle D A N 107d 24′ 12″,	9,979649
Side D N 521757;	5,717468
Sine of the angle A D N 69d 57′ 7″,	9,972853
Side A N 513656:	5,710672

	D	′	″
Excentrique Æquation.	2	34	44
Optique Æquation.	2	38	41
Absolute Æquation.	5	13	25

	S	D	′	″
Middle motion of ♃.	10	0	22	5
Æquation Substract.		5	13	25
Motion of ♃ from ☉ in his Orbite.	9	25	8	40
Node Ascend. ♃ Substr.	3	5	24	26
Argument of Inclination.	6	19	44	14

In

To finde the Reduction, I say,

As the Radius 90ᵈ,	10,000000
To the Sine of the greatest Reduction of ♃ 30″;	6,162696
So the double of the Argument of Inclinat. 39ᵈ 28′ 28″,	9,803275
To the Reduction of ♃ required 19″:	5,965971

And because ♃ is departing from his South Node, and approaching towards the Limits of his greatest Latitude, therefore (according to the former Rule) the Reduction is to be substracted from his place found in the Orbite.

	S	D	′	″
True motion of ♃ from ☉ in his Orbite.	9	25	8	40
Reduction substract.				19
True motion of ♃ from ☉ in the Ecliptique.	9	25	8	21
True motion of ☉ from the Earth.	6	15	18	23
Anomalie of Commutation.	8	20	10	2

To finde the Inclination of ♃.

In the Rectangle Sphæricall Triangle X K L (*viz.* of the second Figure of ♃) is given, (1) the Hypothenuse K L 19ᵈ 44′ 14″ (2) the Side E B 12424 (*viz.* understood by the angle L K X.) Therefore I say,

As the Radius K E 90ᵈ,	10,000000
To the greatest Inclination E B 12424;	4,094261
So the Sine of K L 19ᵈ 44′ 14″,	9,528540
To the Inclination of X L 4196:	3,622801

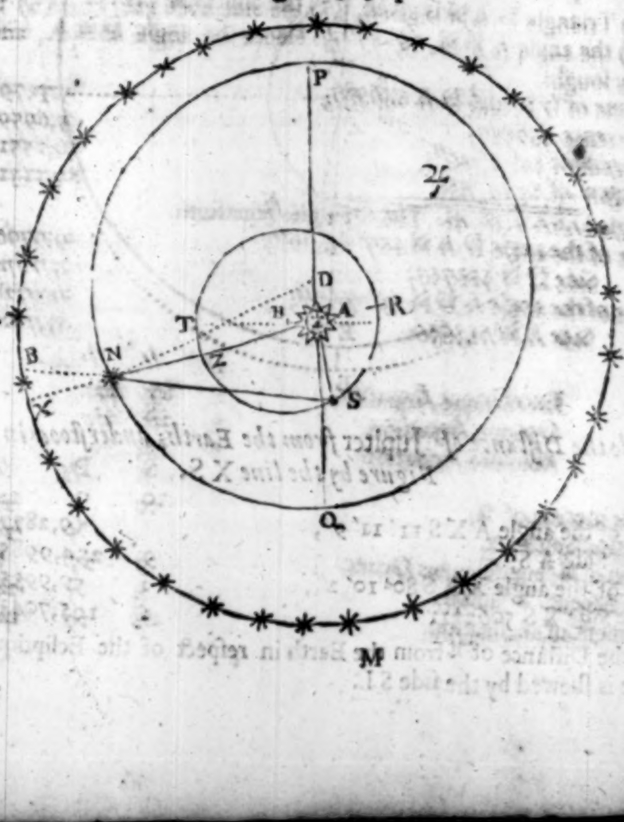
But whereas A X is to be put for the Radius, the Inclination X L will be but 4129, for as the common Radius of ♃ Orbite 522000, is to the Radius A L 513656, so is the Inclination 4196, to the Inclination required X L 4129.

Now having found his Inclination, and his distance from the ☉ in his Orbite, the said Distance is to be corrected by Curtation.

In the third Figure following.

Hypothenuse A L.	513656	Summe	517785	——	5,714149.
Inclination L X.	4129	Difference	509527	——	5,707167.
			Aggregate		11,421316.
Distance of ♃ curtated	513639		Semiag.		5,710658.

Second Figure of Jupiter.



Of

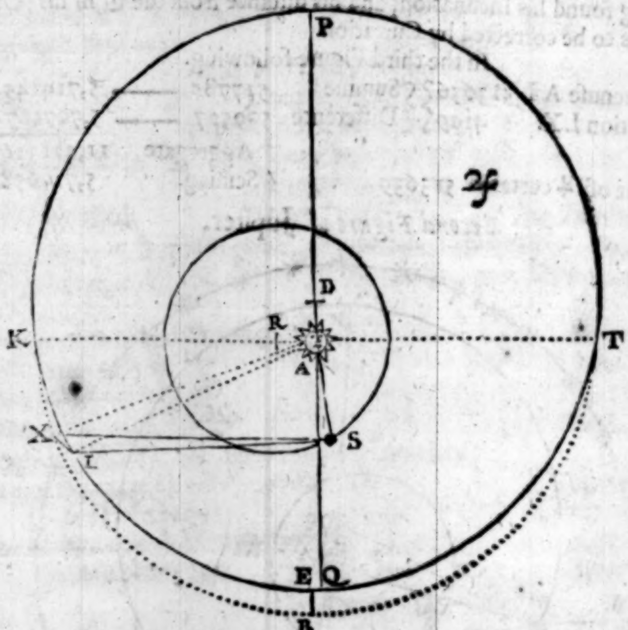
Of the second Inæquality of Jupiter, *which depends upon the Annuall motion of the Earth.*

In this second Theorie of ♃, the outermost great Circle represents the great Orbe of the fixed Stars, the next greater Circle having the letters P N Q P affixed, is the Orbite of ♃, and the third and lesser Circle S R T S denotes the Orbite of the Earth, wherein from R (by Z) to S, I compute the Anomalie of Commutation 260ᵈ 10′ 2″, from which taking the Semicircle RZ 180ᵈ. there remains the Angle S A N 80ᵈ. 10′. 2″. which being known, with the two sides conterminate, *viz.* A N 513639, and A S, 99669, the Angle A N S (which is the Parallax of the Earths Orbe) will thence be found to be 11ᵈ 11′ 9″: for Analogically I say,

As the Summe of the sides A N and A S 613308,	5,787680
To their Difference 413970;	5,616969
So the Tangent of 49ᵈ 54′ 59″,	10,074900
To the Tangent of 38 43 50:	9,904189
Summe 88 38 49.	*viz.* angle A S N: the angle of Elongation.
Difference 11 11 9.	*viz.* angle A N S: the Parallax of the Earths Orbe.

	S	D	′	″
Place of ♃ from ☉ in the Ecliptique, represented by the line.	9	25	8	21
Parallax of the EarthsOrb ANS (equal to the angle BNX) Substr.	11	11	9	
Place of ♃ from the Earth shewed by the line S N B.	9	13	57	12

Third Figure of Jupiter.



To finde the Distance of Jupiter *from the Earth, understood in this Figure by the line* X S.

Sine of the angle A X S 11ᵈ 11′ 9″,	9,287784
Side A S;	4,998560
Sine of the angle X A S 80ᵈ 10′ 2″,	9,993573
Side X S 506231:	5,704349

Which is the Distance of ♃ from the Earth in respect of the Ecliptique, but the true Distance is shewed by the side S L.

To

To finde the Latitude of Jupiter, *seen from the Earth, represented by the angle* X S L.

In the Triangle S L X is given, (1) S X 506231, (2) X L 4130. Hence the angle L S X is demanded.

As X S 506231,	5,704340
To X L 4129;	3,615803
So the Radius 90^d,	10,000000
To the Tangent of the angle L S X 28′ 3″:	7,911454

Therefore the Latitude of ♃ is 28′ 3″ South.

Otherwise,

In the Diagram prefixed, the greatest Inclination of the Orbite of ♃ B E is 1^d 21′ 50″, and the Argument of Inclination K L 19^d 44′ 14″, which known, the Inclination of his Orbite X L, and consequently the angle of Latitude X S L, may speedily be obteined.

I

Radius 90^d,	10,000000
Sine of the angle X K L 1^d 21′ 50″;	8,376615
Sine of K L 19^d 44′ 14″,	9,528540
Sine of X L 27′ 38″:	7,905155
Which is the Inclination of ♃.	

II

Sine of the angle of Elongation 88^d 38′ 49″,	9,999879
Sine of the angle of Commutation 80^d 10′ 2″,	9,993573
Co-tangent of Inclination 27′ 38″,	12,094832
Co-tangent of Latitude 28′ 3″:	12,088526
The same as before.	

CHAP. XVII.

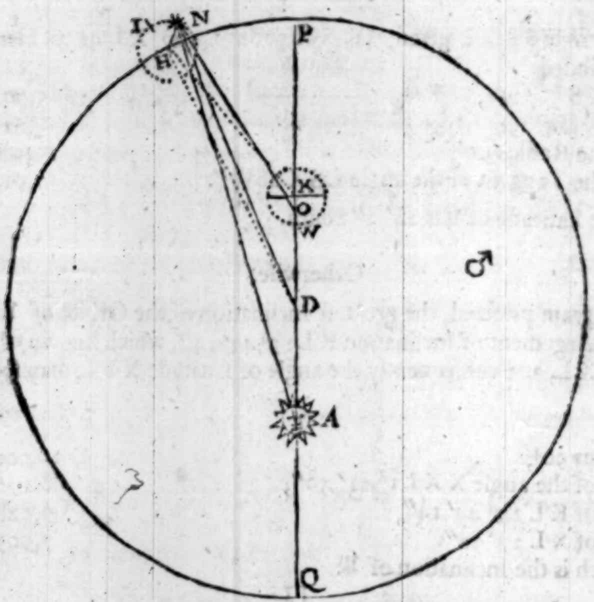
Of the motion of the Planet Mars.

ANno 1587, January 15^d 15^h 0′ (being reduced to the Meridian of *London)* that noble Lord of *Knudstrop*, *Tycho Brahe* observed ♂ in 4^d 2′ ♎, with North Latitude 3^d 13′, *Tycho in Epistolis ad Landgravium Hassiæ*.

At the time of this Observation.

	S	D	′	″
The true motion of the ☉ is	10	5	48	0
The Distance of ☉ from the Earth.	98461			
The middle motion of ♂.	5	4	50	42
Aphelion of ♂.	4	28	43	2
Node Ascend. ♂.	1	16	33	20
Anomalie of ♂.	0	6	7	40

First Figure of Mars.



In this Diagram I number the Anomalie of ♂ from P to H 6d 7′ 40″, whose Complement 173d 52′ 20″, is the angle D X H, which given with the Side D H 152040, and the Side D X 14105, the angle D H X will be 34′ 3″.

Side D H 152040,	5,181958
Sine of the angle D X H 173d 52′ 20″;	9,028352
Side D X 14105,	4,149373
Sine of the angle D H X 34′ 3″:	7,995767

Simple Anomalie P X H,	6d	7′	40′
Angle D H X Substr.		34	3
Anomalie æquated P D H.	5	33	37
Motion of the Epicycle I H N.	11	7	14

In the Triangle D H N.

Summe of D H and D N 152500,	5,183270
Difference 151580;	5,180642
Tangent of 5d 33′ 37″,	8,988343
Tangent of 5 31 37:	8,985715

Aggregate 11 5 14. *viz.* Angle H N D.
Difference 2 0 *viz.* Angle H D N.

Sine of the angle H N D 11d 5′ 14″,	9,283985
Side D H 152040;	5,181958
Sine of the angle D H N 168d 52′ 46″,	9,285274
Side D N 152492:	5,183247

	D	′	″
Anomalie æquated P D H.	5	33	37
Angle H D N Substr.		2	0
Anomalie Co-æquated P D N.	5	31	37.

In the former Diagram ♂ is Supra-Diacentron, therefore I number the motion of the Epicycle 11d 7′ 14″ in the nether part of the Equant from X to O, then I say,

As

As the Radius 90^d,	10,000000	From D X	14105
To the Arch X W 460;	2,662758	Substr. X O	89
So the Sine X O $11^d\ 7'\ 14''$,	9,285274	Rests D O	14016
To the Arch X O 89:	1,948032		

In the Triangle D N O.

Given		
D N 152492	Summe of D N and D O 166508,	5,221435
D O 14016	Difference 138476;	5,141374
Angle D N O 5 31 37	Tangent of $87^d\ 14'\ 11''\frac{1}{2}$,	11,316330
	Tangent of 86 40 42:	11,236269
Angle D N O required.	Angle DNO 0 33 $29\frac{1}{2}$ The Excentrique Æquat	

Again in the Triangle D N A, we have known, (1) the side D N 152492, (2) the side D A 14105, (3) the angle included $174^d\ 28'\ 23''$. Hence the angle D N A, and the side A N are required.

Summe of D N and D A 166597,	5,221666
Difference 138387;	5,141094
Tangent of $2^d\ 45'\ 48''\frac{1}{2}$,	8,683670
Tangent of 2 17 46:	8,603099
Ang. DAN 5 3 $34\frac{1}{2}$.	
Ang. DNA 0 28 $2\frac{1}{2}$ *Viz.* the Optique Æquation.	
Sine of the angle D A N $5^d\ 3'\ 34''$,	8,945428
Side D N 152492;	5,183247
Sine of the angle A D N $5^d\ 31'\ 37''$,	8,983689
Side A N 166536:	5,221508

	D	′	″
Excentrique Æquation.	0	33	$29\frac{1}{2}$
Optique Æquation.	0	28	$2\frac{1}{2}$
Absolute Æquation.	1	1	32

	S	D	′	″
Middle motion of ♂	5	4	50	42
Æquation Substract.		1	1	32
Motion of ♂ from ☉ in his Orbite.	5	3	49	10
Node Ascend. ♂ Substract.	1	16	33	20
Argument of Inclination.	3	17	15	50

To finde the Reduction, and to obtein his true place in the Ecliptique.

As the Radius 90^d,	10,000000
To the Sine of the greatest Reduction of ♂ 53″;	6,408299
So the Sine of the double of the Argument of Inclination, $34^d\ 31'\ 40''$,	9,753434
To the Sine of the Reduction required 30″:	6,161733

Which Reduction is to be added to the Place in the Orbite, because he is departing from his Limit, and is going towards the South Node.

	S	D	′	″
True motion of ♂ from ☉ in his Orbite.	5	3	49	10
Reduction Adde.				30
True motion of ♂ from ☉ in the Ecliptique.	5	3	49	40
True place of the ☉ from the Earth.	10	5	48	0
Anomalie of Commutation.	5	1	58	20

To compute the Inclination of the Planets.

In the Sphæricall Triangle X K L, of the third Diagram of ♂, is given, (1) the Hypothenuse L K $72^d\ 44'\ 10''$, (2) the angle E K B, namely understood by the side E B 4916. Hence, to finde X L, the Analogie is,

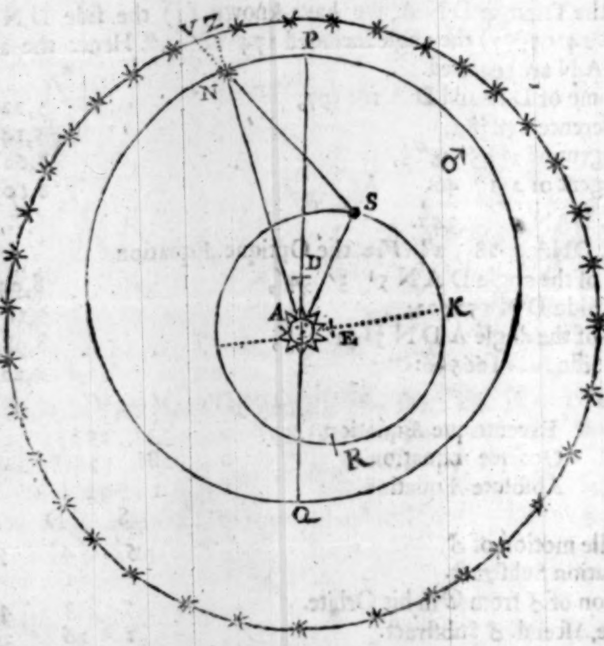
As the Radius K E 90^d,	10,000000
To the greatest Inclination E B 4916;	3,691612
So the Sine of K L $72^d\ 44'\ 10''$,	9,979989
To the Sine of X L 4695:	3,671592

Which is the Inclination agreeing to the Common Radius 152040, but because his distance from the ⊙ 166536, is to be put for the Radius, the Inclination is but 5142. Having then found his Inclination, and his distance from the ⊙ in his Orbite, we are thereby to finde his distance Curtated.

In the third Figure of ♂.

Hypothenuse A L	166536	Summe	171678	5,234714.
Inclination X L	5142	Difference	161394	5,207887
			Aggregate	10,442601
Distance Curtated A X 166456.			Semiaggreg.	5,221300

***Second Figure of* Mars.**



Of the second Inequality, call'd the Parallax of the Earths Orbite.

By the former Praxis, the distance of ♂ from ⊙ (represented in this Diagram by the side A N) is 166456, and the distance of the Earth from the ⊙, understood by the side A S, is 98461, which known, I number the Anomalie of Commutation from R (by K) to S 151^d 58′ 20″, whose Complement 28^d 1′ 40″ is the angle S A N, then having these three parts given, we may (by the solution of the said Triangle) finde the other three parts, namely, (1) the Parallax of the Earths Orbe A N S (being equall to V N Z) (2) the angle of Elongation A S N, (3) the side S N, which is the distance of ♂ om the Earth.

Summe of A N and A S 264917,		5,423109
Difference 67995;		4,832477
Tangent of	75^d 59′ 10′,	10,602781
Tangent of	45 48 5:	10,012149

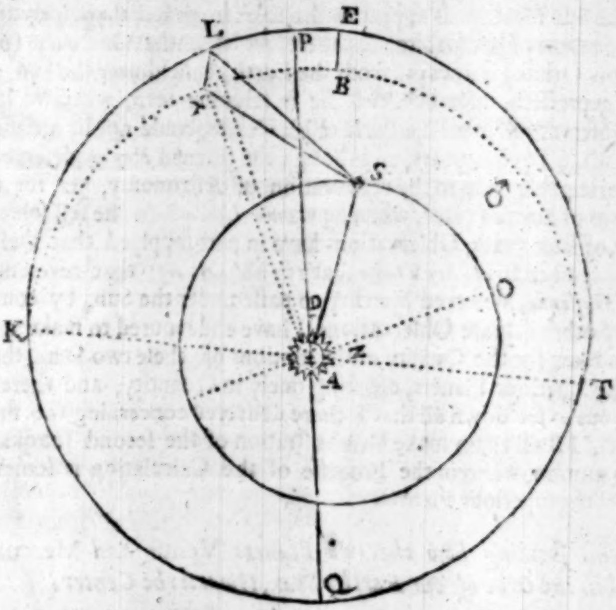
Angle { A S N 121 47 15. Angle of Elongation.
Angle { A N S 30 11 5. Parallax of the Earths Orbe.

Sine of the angle A N S 30^d 11′ 5″,	9,701386
Side A S 98461;	4,993264
Sine of the angle N A S 28^d 1′ 40″,	9,672005
Side N S 92020:	4,963023

Place

	S	D	′	″
Place of ♂ from ☉ represented in the former Figure by the line A N S.	5	3	49	40
Parallax of the Earths Orbe A N S or Z N V, Adde.	1	0	11	5
True place of ♂ from the Earth, shewed by the line S N V.	6	4	0	45

Third Figure of Mars.



To finde the angle of the apparent Latitude of Mars, *represented in this Figure by the angle* L S X.

Radius K E 90^d,	10,000000
Sine of the angle L K X 1^d 51′ 4″;	8,509234
Sine of K L 72^d 44′ 10″,	9,979980
Sine of L X 1^d 46′ 4″:	8,489214
Sine of the angle A S X 121^d 47′ 15″,	9,929423
Sine of the angle S A X 28^d 1′ 40″;	9,672005
Co-tangent of Inclination X L 1^d 46′ 4″,	11,510558
Co-tangent of the angle of Latitude L S X 3^d 11′ 45″:	11,253140

Or in the Triangle L X S, the Analogie may be thus.

As the side X S, is to the side X L: so is the Radius, to the Tangent of the angle L S X.

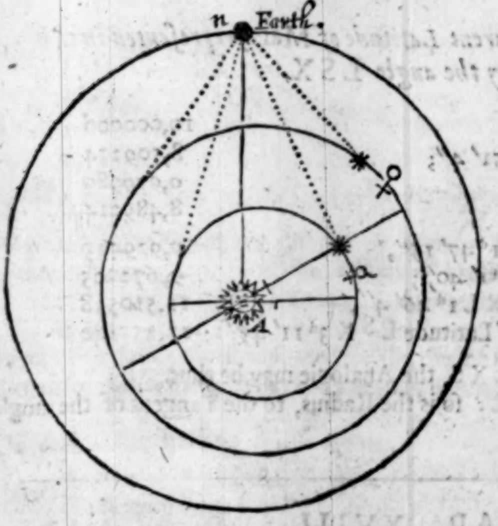
CHAP. XVIII.

Of the motion of the two inferiour Planets, Venus *and* Mercury.

THe two Planets Venus and Mercury we call Inferiours, not that they are inferiour in Lustre or Beauty to the Superiours, but because they are placed next the Center, and keep their perpetuall gyre, and motions within the Orb of the Earth, as the other three do without, and above the Orbe of the Earth: Hence it is that these two Planets (contrary to the superiour Ones) are not visible to us, when they are conjoyn'd in one and the same line, which passeth through the Center of the Sun to the Earth, whereby the acceleration and retardation of their motions,

motions, which in their Revolutions they are subject to, are not so perceptable and easie to be found out, as in the superiour Planets, yet neverthelesse these (like to the other Primarie Planets) move about the Sun with Excentrique motions from him, and are swift in motion when they are neer the Sun, and slow when they are remote from him, according to their Position in respect of the Earth. The brightest of these is Venus, who is placed next within the Earths Orbite, and above the Orbite of Mercury, (who is the neerest Planet to the Center, so that the greatest Digression of Venus from the Sun must needs appear to the Eye far greater then Mercurie, in respect of the large extent of her Orbite, and therefore it is that Mercury (because of the parvity of his Orbite) is always (from the Earth) beheld neer the Sun, as the following Figure expresseth, insomuch that he is seldome seen, whereby his motion for want of Observations in all the Parts of his Orbite, could not be rectified, nor found neer the truth, till of late years, and though the learned *Kepler* deserves much praise for his indefatigable pains in the restauration of Astronomy, yet for want of some Observations of his true place, when he was *in Linea Solis*, he fell somewhat short of truth; but of later years, Observations have in part supplyed that Defect, for upon the 7 of November 1631 *Stylo novo*, at $10^{h}\,28'$ *A. M.* that reverend French-man Monsieur *Gassende*, observed Mercury to passe under the Sun, by comparing which with sundry other acurate Observations, I have endevoured to make a restitution of his motion. Now for the Quality of the motions of these two Stars, they are naturally like to the superiour Planets, differing onely in Quantity, and therefore it would be superfluous to set down all that I there delivered concerning the first Inæquality, neverthelesse, I shall again make Demonstration of the second Inæquality caused by the Earths motion, wherein the Processe of the Calculation is somewhat different from that of the superiour Planets.

A Scheme shewing how the two Planets Venus *and* Mercury *are moved within the Orbe of our Earthy Star, toward the Center.*



By this Figure you may plainly see how these two Planets move within the great Orbe of the Earth towards the Center, and why the greatest Digression of ♀, from the ☉ cannot exceed 48^{d} nor Mercury 29^{d}, as the Angles A N ♀, and A N ☿, represent, whereby they cannot be observed from the Earth never to be in □ or ☍ of the ☉, in regard of the Earths scituation without there Orbites.

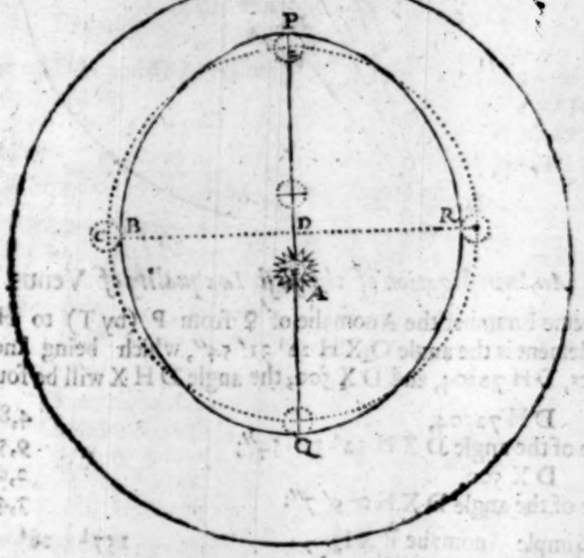
The Prosthaphæresis, or Æquation of the Orbe of ♀ or ☿, (contrary to the superiour Planets) is an angle at the Earth, comprehended between the line of the ☉, and the place of a Planet in his Orbe, understood in the former Figure by the angle A N ♀, or A N ☿, which is nothing else but their apparent Digression from the line of the ☉, as the Planet is beheld from N, the place of the Earth.

But the Nodes of these Planets differ not in Quality of their motions from the superiour Planets; and the Inclination of their Orbites and Latitudes from the Earth, be also much alike.

A

A Table shewing the particular Dimensions of the Orbites of Venus *and* Mercury *in such parts, whereof the Radius of the Earths Orbe is* 100000.

	♀	☿
Semidiameter of the Excentrique Circle D Z or D G	72304	38240
Semidiameter of the Epicycle B G or Z P.	3	400
Which in the Circle Equant æqualizeth X V.	3	400
Bi-sected Excentricity D X or D A.	500	8130
In the Ellipsis.		
Aphelion Semidiametient D P equall to D Q.	72307	38640
Diacentron Semidiametient D B, or D R.	72301	37840



In this Figure, the outermost Circle represents the great Orbe of the Earth, and the Ellipsis within the same, having the Letters P B Q R affixed, is the Orbite of ♀ or ☿, whose Dimensions are notified above in the Table.

CHAP. XIX.

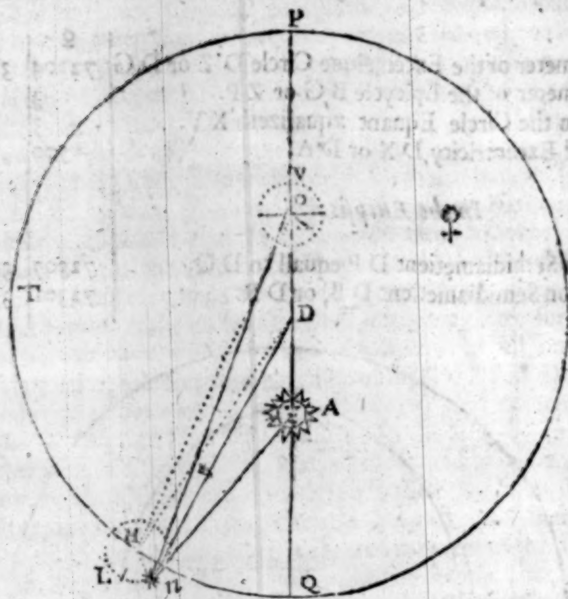
Of the Calculation of the true motion of the Star of Venus.

ANno 1587, January $15^d\ 4^h\ 40'$ P. M. noble *Tycho* observed ♀ in $16^d\ 55'$ ♓, with $2^d\ 39'$ North-Latitude. *Vide Pag. 56 Epistolarum.*

For the difference of Meridians between *London* and *Uraniburge* is to be substracted 50′, therefore the time in the Meridian of *London*, was Jan. $15^d\ 3^h\ 50'$, at which time,

	S	D	′	″
The true motion of the ☉ is	10	5	19	36
Distance of the ☉ from the Earth.	98454			
Middle motion of ♀.	3	11	38	42
Aphelion of ♀.	10	4	12	36
Node Ascend. ♀.	2	12	51	1
Anomalie of ♀.	5	7	28	6

First Figure of Venus.



An Investigation of the first Inaquality of Venus.

In this Scheme I number the Anomalie of ♀ from P (by T) to H 157d 28′ 6″, whose Complement is the angle Q X H 22d 31′ 54″, which being known, with the including sides, D H 72304, and D X 500, the angle D H X will be found 0d 9′ 7″.

D H 72304,				4,859162
Sine of the angle D X H 22d 31′ 54″;				9,583418
D X 500,				2,698970
Sine of the angle D X H 0d 9′ 7″:				7,423226

Simple Anomalie P X H.	157d	28′	6″
Angle D X H Substr.		9	7
Anomalie æquated P D H.	157	18	59
Motion of the Epicycle.	314	37	58.

In the Triangle D H N.

Summe of D H and H N 72307,	4,859180
Difference 72301;	4,859144
Tangent of 22d 41′ 1″,	9,621148
Tangent of 22 40 51	9,621112

Ag. 45 21 56 } angle { H N D.
Dif. 0 0 6 } angle { H D N.

Sine of the angle H N D 45d 21′ 56″,	9,852238
D H 72304,	4,859162
Sine of the angle D H N 134d 37′ 58″,	9,852250
D N 72306:	4,859174

	D	′	″
Anomalie æquated P D H.	157	18	59
Angle H D N Adde,			6
Anomalie Co-æquated.	157	19	5;

In

In this Paradigme Venus is Infra-Diacentron, and therefore the motion of the Epicycle is to be accounted in the uppermost Semicircle of the Equant from X towards V, therefore I say,

As the Radius X V 90^d,	10,000000	To D X	500
To the Arch X V 3 parts;	0,477121	Adde X O	2
So the Sine X O $45^d\ 22'\ 2''$,	9,852250	D O	502
To the Arch X O 2^d:	0,329371		

In the Triangle D N O.

D N 72306.	given	Summe of D N and D O 72808,	4,862179
D O 502.		Difference 71804;	4,856149
Angle O D N $157^d\ 19'\ 5''$.		Tangent of $11^d\ 20'\ 27''$,	9,302246
		Tangent of 11 11 18:	9,296216
Angle D N O required.		Angle D N O 0 9 9. The Excentrique Æquation.	

In the Triangle D N A.

I

Summe of D N and D A 72806,	4,862167
Difference 71806;	4,856161
Tangent of $78^d\ 39'\ 32''$,	10,697743
Tangent of 78 30 19:	10,691737
Angle D N A 0 9 13. The Optique Æquation.	

II

Sine of the angle D A N $157^d\ 9'\ 52''$,	9,588930
Sine of the angle A D N $157^d\ 19'\ 5''$;	9,586154
Side D N 72306,	4,859174
Side A N 71845:	4,856398

	D	′	″
Excentrique Æquation.	0	9	9
Optique Æquation.	0	9	13
Absolute Æquation.	0	18	22.

	S	D	′	″
Middle motion of ♀.	3	11	38	42
Æquation Substract.			18	22
Motion of ♀ from ☉ in her Orbite.	3	11	20	22
Node Ascend. Substract.	3	12	51	1
Argument of Inclination.	0	28	29	21.

To finde the Reduction.

As the Radius 90^d,	10,000000
To the Sine of the greatest Reduction $3'\ 0''$;	6,940847
So the Sine of the Double of the Argument of Inclinat. $56^d\ 58'\ 42''$	9,923484
To the Sine of the Reduction required $2'\ 31''$:	6,864331

Because ♀ is departing from her North Node, the Reduction is to be substracted from her place in the Orbite.

	S	D	′	″
True motion of ♀ from ☉ in her Orbite.	3	11	20	22
Reduction Substract.			2	31
True motion of ♀ from ☉ in the Ecliptique.	3	11	17	51
True place of the ☉ Substr.	10	5	19	36
Anomalie of Commutation.	5	5	58	15.

To finde the Inclination of the Planes.

In the third Figure of ♀ we have in the Rectangle Sphæricall Triangle X K L two parts given: (1) the Hypothenuse K L $28^d\ 29'\ 21''$, (2) the Valor of the angle L K X (understood by the Side B E) 4264, the side X L being required.

As the Radius K E 90^{d},	10,000000
To the Sine of the greatest Inclination E B 4264;	3,629817
So the Sine of K L 28^{d} 29′ 21″,	9,678912
To the Sine of X L 2034:	3,308329

But whereas the distance of ♀ from ☉ 71845, is to be put for the Radius, the Inclination X L will be but 2021. For,

As 72304, bears Proportion to 71845, the same Proportion bears 2034, to 2021.

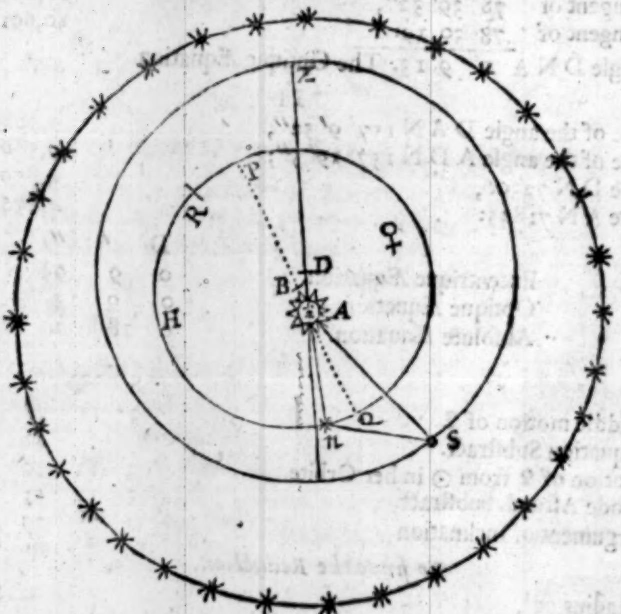
To finde the Distance Curtated, of Venus *from the Sun.*

The distance of ♀ from ☉ in her Orbite is above found to be 71845, and the Inclination of her Orbite 2021. Hence, her distance Curtated is thus found.

In the third Figure of ♀.

Hypothenuse A L 71845	Summe	73866	—	4,868445
Inclination X L 2021	Difference	69824	—	4,844005
	Aggregate			9,712950
Distance of ♀ curtated A X 71817.	Semiaggreg.			4,856225

Second Figure of Venus.



Of the second Inæquality of Venus, *call'd the Prosthapharesis, or Parallax of her Orbe.*

In this Diagram I number the Anomalie of Commutation 155^{d} 58′ 15″, from R (by H, to N, the Complement whereof is the angle S A N 24^{d} 1′ 45″, which known, with the side A S (the distance of the Earth from the ☉) 98454, and the side A N (the Distance of the ♀ from ☉) 71817, the side S N (the Distance of ♀ from the Earth) and the angle A S N (the Parallax of the Orbe) may thereby be found according to the following work.

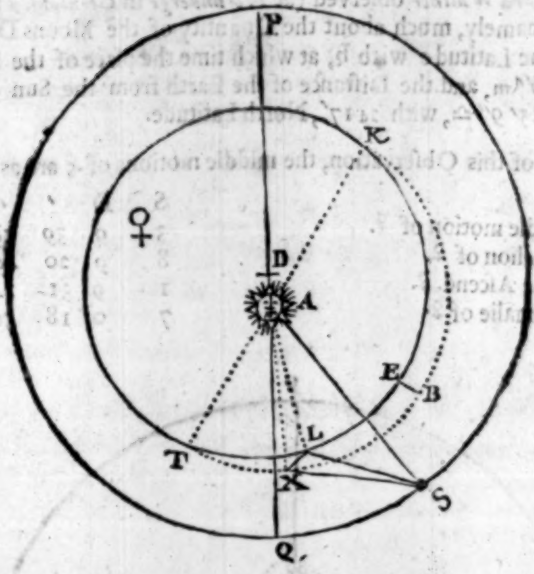
Sum of A S and A N 170271,	5,231140	Sine of the ang. ASN 41^{d} 40′ 2″,	9,822693
Difference 26637;	4,425485	Side A N;	4,856225
Tangent of 77^{d} 59′ 7″,	10,671974	Sine of the ang. SAN 24^{d} 1′ 45″,	9,609809
Tangent of 36 19 5:	9,866319	Side S N 43989:	4,643341

Angle ASN 41 40 2. which is the Parallax of the Orbite of ♀, in respect of the Earths extracentricall position at S.

Place

	S	D	′	″
Place of the ☉ from the Earth.	10	5	19	36
Parallax of the Orbe, Adde.	1	11	40	2
True motion of ♀ from the Earth.	11	16	59	38.

Third Figure of Venus.



To finde the true Latitude of Venus *from the Earth.*

In the Triangle S X L, we before found X S to be 43989, and X L, to be 2021, from whence the angle of Latitude X S L is required: therefore the Analogie is,

As X S 43989,	4,643341
To L X 2021;	3,305565
So the Radius 90^{d},	10,000000
To the Tangent of the angle $2^{d}\ 37'\ 50''$:	8,662224

Which $2^{d}\ 37'\ 50''$ was the true Latitude of ♀ from the Ecliptique, in respect of the Earths scite at S. The said angle may also be found by the Inclination, as is shew'd in the superiour Planets, which way (because I follow it in the Book) I shall here for variety sake, insert.

Radius T E 90^{d},	10,000000
Sine E B $3^{d}\ 22'\ 50''$;	8,770613
Sine T L $28^{d}\ 29'\ 21''$,	9,678512
Sine L X $1^{d}\ 36'\ 42''$:	8,449125
Sine of the angle of Elongation A S X $41^{d}\ 40'\ 2''$,	9,822693
Sine of the angle of Commutation S A X $24^{d}\ 1'\ 45''$,	9,609809
Co-tangent of the Inclination L A X $1^{d}\ 36'\ 42''$,	11,550731
Co-tangent of the Latitude L S X $2^{d}\ 37'\ 50''$:	11,337848

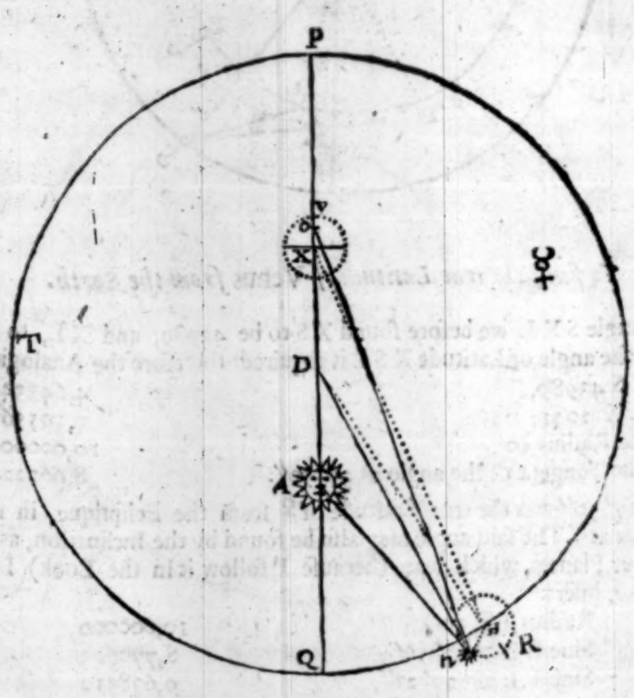
CHAP. XX.

A Demonstration of the true motion of the Star of Mercury.

IN the year 1481, October 22d 5ho 25′ A. M. (being reduced to the Meridian of *London) Bernard Walther* observed (at *Noremberge* in *Germanie)* that ☿ was more East then ♄, namely, much about the Quantity of the Moons Diameter, having about the same Latitude with ♄, at which time the place of the Sunne from the Earth is 7d 53′ 29″ ♏, and the Distance of the Earth from the Sun 98980, also the place of ♄ is 18d 15′ 9″ ♎, with 2d 17′, North Latitude.

At the time of this Observation, the middle motions of ☿ are as followeth.

	S	D	′	″
Middle motion of ☿.	3	9	39	39
Aphelion of ☿.	8	9	26	49
Node Ascend. ☿.	1	9	31	14
Anomalie of ☿.	7	0	18	50.



A Synopsis of the Calculation.

In the premised Diagram, I number the Anomalie of ☿ from P by T to H, 210d 18′ 50″, whose Complement to the Circle is the angle P X H 149d 41′ 10″, which given, with D H 38240, and D X 8130, the angle D H X will be 6d 9′ 37″. For,

D H 38240,	4,582518
Sine of the angle D X H 149d 41′ 10″;	9,703065
D X 8130,	3,910090
Sine of the angle D H X 6d 9′ 37″:	9,030637

Com-

Complement of the simple Anomalie P X H.	149^{d} 41′ 10″
Angle X H D Substract.	6 9 37
Complement of the Anomalie æquated P D H	143 31 33
Motion of the Epicycle and the Æquant.	72 56 54

In the Triangle D H N.

I

Summe of D H and H N 38630,	4,587037
Difference 37840;	4,577951
Tangent of 36^{d} 28′ 27″,	9,868799
Tangent of 35 54 11:	9,859713
Angle HND 72 22 38.	
Angle H D N 34 16.	

II

Sine of the angle H N D 72^{d} 22′ 38″,	9,979125
D H 38240;	4,582518
Sine of the angle N H D 107^{d} 3′ 6″,	9,980476
D N 38359:	4,583869

	D	′	″
Complement of the Anomalie æquated P D H.	143	31	33
Angle H D N Adde,		34	16
Complement of the Anomalie Co-æquated P D N.	144	5	49

☿ being Infra-Diacentron, I number the Variation in the upper Semicircle of the Æquant from X to O, then I say,

As the Radius X V 90^{d},	10,000000	To D X 8130
To the Arch X V 400;	2,602060	Adde X O 382
So the Sine X O 72^{d} 56′ 54″,	9,980476	D O 8512
To the Arch X O 382:	2,582536	

In the Triangle D N O.

D N 38359	given	Summe of D N and D O 46871	4,670904
D O 8512		Difference 29847;	4,474900
Angle O D N 144^{d} 5′ 49″		Tangent 17^{d} 57′ 5″ ½,	9,510524
		Tangent 11 39 26	9,314520
Angle D N O required.		Angle DNO 6 17 39½. The Excentrique Æquat.	

In the Triangle D N A.

Summe of D N and D A 46489,	4,667350
Difference 30229;	4,480424
Tangent 72^{d} 2′ 54″,	10,489476
Tangent 63 30 54:	10,302550

Optique Æquat. 8 32 0.

Sine of the Complement of P A N 44^{d} 26′ 11″,	9,845170
D N 38359;	4,583869
Sine of A D H 35^{d} 54′ 11″,	9,768205
A N 32130:	4,506904

	D	′	″
Excentrique Æquation.	6	17	40
Optique Æquation.	8	32	0
Absolute Æquation.	14	49	40.

	S	D	′	″
Middle motion of ☿.	3	9	39	39
Æquation Adde.		14	49	40
Motion of ☿ from ☉ in his Orbite.	3	24	29	19
Node Ascend. ☿ Substr.	1	9	31	14
Argument of Inclination.	2	14	58	5

To

To finde the Reduction.

As the Radius 90^d,	10,000000
To the Sine of the greatest Reduction 12′ 30″;	7,560635
So the Sine of the double of the Argument of Inclination 30^d 3′ 50″,	9,699808
To the Sine of the Reduction required 6′ 15″:	7,260443

	S	D	′	″
True motion of ☿ from ☉ in his Orbite	3	24	29	19
Reduction Substr.			6	15
True motion of ☿ from ☉ in the Ecliptique.	3	24	23	4
Place of the ☉ Substract	7	7	53	29
Anomalie of Commutation.	8	16	29	35.

To finde the Inclination of his Orbite from the Ecliptique.

In the Sphaericall Triangle Q X L (of the second Figure following) is given, (1) the Hypothenuse Q L 74^d 58′ 5″, (2) the angle of greatest Inclination X Q L 6^d 54′, or (in our numbers it is understood by the side E B) 4594 parts, then to finde the Inclination X L, I say,

As the Redius Q E 90^d,	10,000000
To the greatest Inclination E B 4594;	3,662191
So the Sine of Q L 74^d 58′ 5″,	9,984878
To the Inclination X L 4436	3,647069

But putting the distance of ☿ from the ☉ 32130, for the Radius, the Inclination X L will be but 3728. For,

As the Common Radius 38240,	4,582518
To the distance of ☿ from ☉ 32130;	4,506904
So X L 4436,	3,647069
To X L 3728:	3,571455

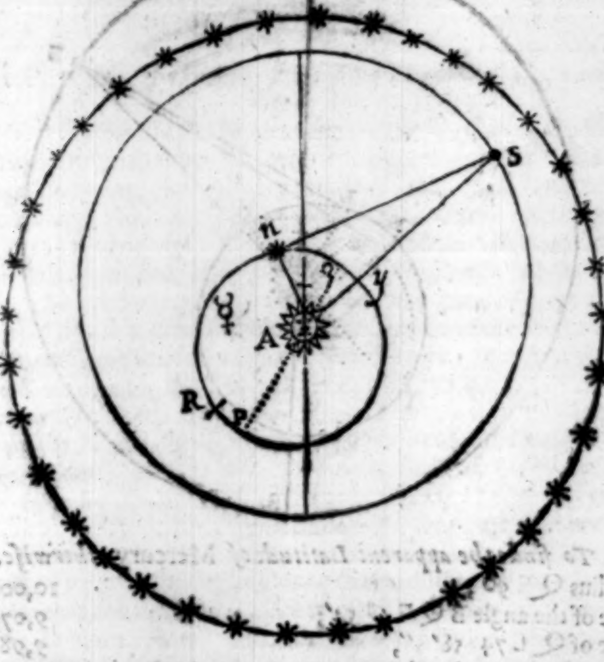
To finde the Distance of Mercury *from* Sol *Curtated.*

Having the distance of ☿ from ☉ 32130, and the Inclination of his Orbite 3728, his distance corrected by Curtation, may be obteined in manner following.

Hypothenuse A L.	32130	Summe	35858	4,554586.
Inclination X L.	3728	Difference	28402	4,453348.
		Aggregate		9,007934.
Distance of ☿ Curtated	31913	Semiag.		4,503967.

Of

Of the second Inæquality of Mercury, *called the Parallax of the Orbe.*



The Anomaly of Commutation is by the foregoing Operation found to be 8ˢ 16ᵈ 29′ 35″, which I reckon from R, by P, to N, from which deducting the Semicircle R Y 180ᵈ, the Remainder 76ᵈ 29′ 35″, is the angle Y A N, or S A N. Also the distance of ☿ from the ⊙ A N is 31913, and the distance of the Earth from the ⊙, A S 98980. Hence the Parallax of the Orbite, or angle A S N is required, as also the distance of ☿ from the Earth, represented by the line S N.

Summe of A S and A N 130893,	5,116916
Difference 67067;	4,826508
Tangent of 51ᵈ 45′ 12″,	10,103343
Tangent of 33 1 31:	9,812935
Angle A SN 18 43 41. Parallax of the Orbe.	
Sine of the angle A S N 18ᵈ 43′ 41″,	9,506608
A N 31913;	4,503967
Sine of the angle *S* A N 76ᵈ 29′ 35″;	9,987819
S N 96644:	4,985178

	S	D	′	″
Place of ⊙ from the Earth	7	7	53	29
Parallax of the Orbe substract.		18	43	41
Place of ☿ from the Earth.	6	19	9	48.

To finde the apparent Latitude of Mercury.

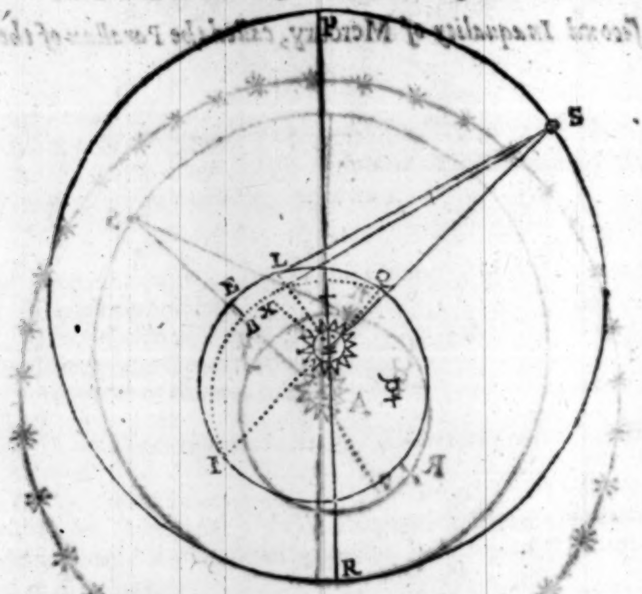
In the Triangle *S* X L is given (1) *S*X *96644*: (2) X L 3728. Hence the angle L*S*X is demanded.

As X *S* *96644*,	4,985178
To X L 3728;	3,571455
So the Radius *90*ᵈ,	10,000000
To the Tangent of the angle L S X 2ᵈ 12′ 32″:	8,586277

Which is the true Latitude of ☿ in respect of the Earths position at S, and is known to be north, because the Argument of his Inclination is 74ᵈ 58′ 5″, for in all the Planets.

	s	s	s	s	s	s	
If the Argument of Inclination be	0	1	2	3	4	5	The Latitude is North.
	6	7	8	9	10	11	The Latitude is South.

⊙ The



To finde the apparent Latitude of Mercury *otherwise.*

Radius Q E 90,	10,000000
Sine of the angle B Q E $6^d\ 54'$;	9,079676
Sine of Q L 74 $58'\ 3''$,	9,984879
Sine of X L $6^d\ 9'\ 46''$;	8,964555
Sine of Elongation $18^d\ 43'\ 41''$,	9,506608
Sine of Commutation $76^d\ 29'\ 35''$;	9,987819
Co-tangent of Inclination $6^d\ 9'\ 46''$,	10,932521
Co-tangent of Latitude $2^d\ 12'\ 32''$;	11,413713

Therefore the Latitude of ☿ is $2^d\ 12'\ 32''$ North, as before.

Bullialdus fitting his Example in Mercury (*Fol. 44. Astron. Philolaica*) to the time of this Observation, he gathereth, that ☿ was in 19 7′ ♎ with north Latitude $2^d\ 15'$, and ♄ in $18^d\ 13'$ ♎, with north Latitude 2 9′: so that ☿ was distant from ♄ 54′ agreeing with my Calculation, but differing from the place that *Walther* sets down, ⅓ of a Degree in Longitude, and ½ of a Degree in Latitude, which is but a little, considering the Observation was made onely by the bare sight, for their apparent distances being taken by estimation, doth make them always appear lesse then they are, in respect of the circumradiancy and explication of their Rayes, which being not at all considered by the Observator, produceth a little difference, yet not so much, as to make any sensible alteration, neither can I question the Observation as short of truth.

Thus, have I with much plainnesse and brevity described, how the Earth, Moon, & other Planets, perform their real & simple motions in their peculiar Eliptick-paths, after a most stately and Harmonious Order, by the alone speculation and knowledge whereof we are enabled to calculate their true Motions, and indeed salve, *ad punctum ipsissimum*, that wonderfull admired inæquality of Appearance, which formerly puzzled all the Astronomers of *Europe*, till such time, as the divine *Urania* stirr'd up her servant *Copernicus* to free her sons from the *Peripateticks*, the adventitious figments of mans composition, those fictious Circles, and Monsters of Nature, which the Ancients (being destitute of better helps, and not knowing the Fountain, from whence did spring those seeming Directions, Retrogradations, and Stationary Appearances) fondly devised, which hath already most deservedly received their confutation in sundry Tracts already published, insomuch, that I shall here, save my pen that labour, supposing that those, that know any thing of this most noble Science, will willingly imbrace the truth, and free themselves from those Ægyptian Skars, those Ptolomaick Hypothesis, which a long time have miserably defaced the Native Beauty of the divine *Urania*. *Impossibile est Excentricorum, & Epicyclorum positio, nec aliquis est ex Mathematicis adeo stultis, qui veram illam existimet. Gal. cap* 7. And we may not unfitly apply the propheticall saying of *Seneca* to our purpose. *Veniet tempus quo ista, quæ nunc latent, in lucem dies extrahet, & longioris ævi diligentia.*

CHAP.

CHAP. XXI.

Of the Semidiameters of the Sun, Moon, and Shadow of the Earth.

COmming now to treat of the Semidiameters of the ☉, ☾, and ſhadow of the Earth, and of their magnitude and proportion one to another, I ſhall, before I enter upon that taske, give you to underſtand, that there hath been great diſſention amongſt Authours, for above theſe 1800 years concerning this particular. The firſt that I read of was a Philoſopher amongſt the Greeks, of great note, and famous for his judgement and learning in the Mathematiques, whoſe name was *Ariſtarcus Samius*. This Authour publiſhed a Book of the particular dimenſions of the ☉ and ☾, wherein he made demonſtration of the diſtance of the Sun, Moon, and Earth, and of their true Magnitudes mutually, which work, though it was a piece eſteem'd moſt rare & excellent in thoſe brutiſh times, yet he deliver'd not the right uſe thereof. After him next followed *Hypparchus*, a man renowmed to this preſent day (whoſe Diagram we ſhall inſert) he thorowly found out its uſe, and was the firſt that publiſhed the ſame, whereby he made better Demonſtration, of the Magnitude and Intervalls of theſe three Bodies, the ☉, ☾, and Earth, then any had done before him, yet (I grieve to ſpeak it) the Book periſhed in thoſe darke times, and had not *Ptolomie* (by the goodneſſe of God) reteined the uſe and demonſtration thereof (in ſome meaſure) in his Almageſt, we might, for ought I know (notwithſtanding the facility and certainty thereof) have waded ſtill in ignorance without it, neither may we think it ſtrange, for we ſee many ſince *Ptolomies* time, that have not had a full apprehenſion thereof, as *Albategnius*, *Alphonſus*, and ſundry others, nay, to go further, we can ſcarce ſay ſo much of thoſe famous Neotericks, *Regiomonte*, *Copernicus*, and *Tycho Brake*, and albeit *Lansberge* in his *Uranometria*, pretends to follow the ſame, yet I may ſay without wrong to his profeſſion (for indeed he was a ſingular good Divine) he hath made as ſilly a demonſtration of it, as any of his predeceſſors, but the learned *Kepler* fully underſtood the proper uſe thereof, and hath made a better and cleerer demonſtration of it, then any that I have met with, hath done before him, as may be ſeen in thoſe his learned Epitomes of his Copernican Aſtronomie, and in his Rudolphine Tables, whoſe demonſtration is likewiſe reteined of the expert *Bullialdus* in his *Aſtronomia Philolaica*, who hath much amplified the right uſe thereof; But leſt this Relation ſhould be thought ſuperfluous, or unneceſſary, I will briefly come to make demonſtration thereof, and then to practiſe.

In the annexed Diagram, obſerve that A repreſents the Center of the Sun, when he is Perig.

L. The Center of the Moon.

B. The Center of the Earth.

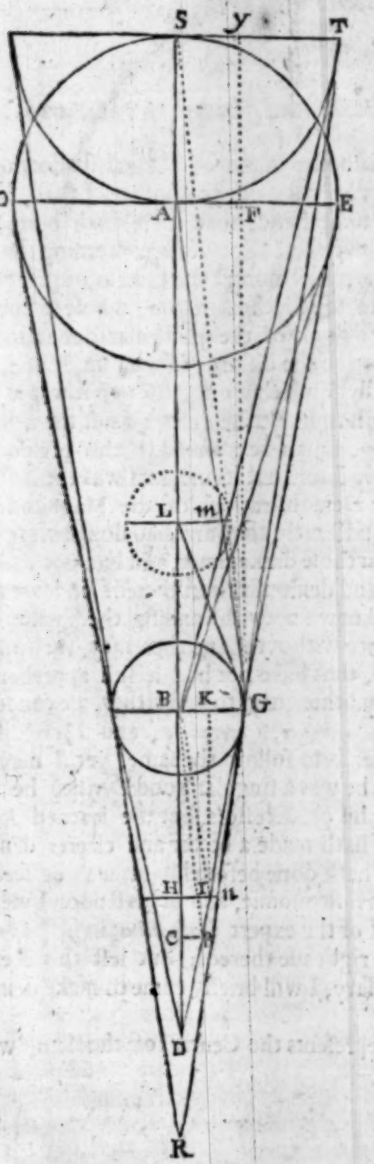
S. The Center of the Sun when he is Apog.

H B I. The apparent Perigæan Semidiameter of the ſhadow.

C B P. The apparent Apogæan Semidiameter of the ſhadow.

A B E, or A G E. The apparent Semidiameter of the Sun, when he is Perig.

S B T, or S G T. The apparent Semidiameter of ☉ in his Apog.



A E or S T, the true Semidiameter of the ⊙.
D, the Vertex of the Conicall point of the Earths shadow when the ⊙ is Perig.
R, the said point when the ⊙ is Apog.
B D G, the Semi-angle of the Cone of the Earths shadow, when the ⊙ is Perig.
B R G, the Semi-angle thereof when he is Apog.
B D R, the Axis of the shadow.
L M, the true Semidiameter of the ☾.
L B M, the angle of her apparent Semidiameter.
B A G, the Horizontall Parallax of the ⊙, when he is Perig.
B S G, the Horizontall Parallax of the ⊙ when he is Apog.
B L G, the Horizontall Parallax of the ☾.
Lastly, let the lines G Y, and I K, be drawn parallel to the line of the Axis D S. Hence it followeth,

1 That the Horizontall Parallax of the ⊙, and Semi-angle of the Cone of the Earths shadow, are equall to the apparent Semidiameter of the ⊙.

2 That the Semi-angle of the Cone of the Earths shadow, is ever lesse then the Horizontall Parallax of the Moon, and the Difference of them is the apparent Semidiameter of the Earths shadow.

3 That the Aggregate of the apparent Semidiameter of the ⊙, and shadow of the Earth, are equall to the Aggregate of the Horizontall Parallax of the ⊙ and ☾, so that out of the Aggregate of the Horizontall Parallax of the ⊙ and ☾, substracting the apparent Semidiameter of the Sunne, the Residue will be the apparent Semidiameter of the Earths shadow *in Loco transitus Lunæ*.

CHAP. XXII.

Having the true Semidiameter of the Sun, *and his Distance from the* Earth, *to finde his apparent Semidiameter.*

THe true Semidiameter of the Sun is 478 $\frac{1}{2}$ parts, which being known, with his Distance from the Center of the Earth, his apparent Semidiameter may speedily be obteined. For exercise sake, let us imagine the ⊙ be Apog. and his apparent Semidiameter be required: His Apogæan distance from the Center of the Earth is 101803, therefore in the Triangle B S T is given.

1 BS 1018030	given	B S 1018030,	6,007760
2 T S 4785		T S 4785;	3,679882
3 Angle S 90^d.		Radius 90^d,	10,000000
Angle S B T required.		Tangent of the angle S B T 16′ 9″:	7,672122

And this is the apparent Semidiameter of the Sun, when he is farthest remote from the Center of the Earth, which is also equall to the angle S G T.

Again, admit the Sun be neerest the Center of the Earth, (that is when the Earth is perig.) at which time the Centrical Intervall of these two Globular Bodies is 98229, this known, the operation is performed as before.

The Logarithme of A B 98229|0,	5,992240
The Logarithme of A E 478|5;	3,679882
The Radius 90^d,	10,000000
The Tangent of A B E 16′ 45″:	7,687642

Which 16′ 45″ is the apparent Semidiameter of the Sun, when he is neerest to the Earth, exceeding his Apogæan Semidiameter 36″, which is caused by the variation of the Distance of these two Bodies.

CHAP. XXIII.

To finde the apparent Semidiameter of the Moon.

THe true Semidiameter of the Moon (as I have ofen experimented both by Eclipses of the ☉, and her passage by the fixed Stars) is 19′ 9″, or $19\frac{15}{100}$, understood in the former Figure by L M, which being known, with her distance from the Earth, her apparent Semidiameter may be acquired according to the Analogie before laid down in the former Chapter, therefore, for numerall illustration, let us imagine the Moon be Apog. or farthest removed from the Earth, where her distance is 4225. Now if we prolong this distance with two Cyphers, we may also prolong the true Semidiameter of the Moon 19, with the Numerator of the Fraction 15, as in the following work.

In the Triangle B L M.

1 B L 4225.00	given	B L 4225.00,	5,625827
2 L M 19.15		L M 19.15;	3,282169
Angle L B M required		Radius 90^d,	10,000000
		Tangent of the angle L B M:	6,656342

Whose Arch is 15′ 35″, which is the apparent Semidiameter of the Moon when she is Apog.

When the Moon is Perig. or distant from the Earth but 3873.

Analog.	B L 387300,	5,588047
	L M 1915;	3,282169
	Radius 90^d,	10,000000
	Tangent of the angle L B M 17′ 0″:	7,694122

After this manner may the apparent Semidiameter either of the ☉ or ☾ be obteined at any moment, which yields aboundance of facility as well as dexterity, by help of my Numbers, which are very exact and exquisite in all Astronomicall operations.

CHAP. XXIV.

1 *To finde the apparent Semidiameter of the Earths shadow, the Longitude thereof, Semi-angle of the Cone, &c.*

FRom the Aggregate made of the Horizontall Parallax of the Sun and Moon, substract the apparent Semidiameter of the Sun, the Residue is the apparent Semidiameter of the shadow at the time proposed, according to the 3 Prop. of the 21 Chapter.

When

When the Sun and Moon are both Apog. *or* Aphelion.

The Horizontall Parallax of the ⊙ is	2′	18″
The Horizontall Parallax of the ☾.	55	43
Aggregate	58	1
The Semidiameter of ⊙ Substr.	16	9
Semidiameter of the Earths shadow.	41	52

When the Sun and Moon are both Perig.

The Horizontall Parallax of the ⊙ is	2	23
The Horizontall Parallax of the ☾.	60	49
Aggregate	63	12
The apparent Semidiameter of ⊙ Substr.	16	45
The apparent Semidam. of the shadow.	46	27.

2 *To finde the Semi-angle of the Cone of the Earths shadow.*

In the former Example the apparent Semidiameter of the ⊙ understood by the angle S G T is	16′	9″
The Horizontall Parallax of ⊙ BSG, or (which is all one) SGY Substr.	2	18
Remains the angle Y G T.	13	51

Which by reason of the Parallellesme of the lines B S, G Y, is equall to the angle S R T, which is the Semi-angle of the Cone of the Earths shadow.

In the latter Example the angle of the apparent Semid. of ⊙ A G E is.	16′	45″
The Horizontall Parallax of the ⊙ B A G, or A G F Substr.	2	23
Remaines the Semiangle of the Cone F G E, or B D G.	14	22

3 *To finde the Longitude of the Earths shadow.*

In the Triangle B D G, of the former Diagram is given, (1) B G the Semidiameter of the Earth 68½, (2) the angle B G D 89° 45′ 38″. Hence the Side B D is demanded.

Radius 90°,	10,000000
Tangent of B D G 89° 45′ 38″;	12,378920
B G 68½,	1,835690
B D 16391:	4,214610

Which side B D is the Longitude of the Axis of the Earths shadow, from which taking B H 3873 (the Distance of the Moon from the Earth) it leaveth D H 12518.

4 *To finde the true Semidiameter of the shadow or side* H I.

In the Triangle D H I, the angle D is 14′ 22″, and the side D H 12518, the side H I being demanded.

Analogie	Radius 90°,	10,000000
	Tangent of D 14′ 22″;	7,621080
	D H 12518,	4,097535
	C I 52 $\frac{31}{100}$:	1,718615

Or in the Triangle B H I, having B H 3873, and the angle H B I 46′ 27″, the side H I, according to the same proportion, will be found (as before) 52 $\frac{31}{100}$.

CHAP.

CHAP. XXV.

Of the Proportion and Magnitude of the three great Bodies, the Sun, Moon *and the* Earth.

IT is a piece of no ſmall difficulty to finde the true magnitude of the Cœleſtiall Bodies, in regard their apparent magnitude is ſo various to be obteined with Inſtrument, for often times it hapneth, that that which the eye apprehends plain and certain, is for the Interpoſition of other Cauſes moſt uncertain, and ſo procreates an Obſervation doubtfull and erroneous, and inſufficient whereon to raiſe a Geometricall Edifice: and the reaſon hereof is, becauſe the eye receives the ſpecies of things in a different kinde, ſometime apprehending the Object diſtinctly, ſometime confuſedly; and ſo the ſpecies may be varied both in reſpect of the Colour and Magnitude. Secondly, the Diſpoſition of the vaporous Ayre is ſuch, that the bright Rays of the Stars penetrating the ſame, doth for the moſt part make them appear far greater then they are (yet if the Ayre be very pure and thin, then may their apparent Diameters be taken with leaſt errour) but the apparent Semidiameters of the Sun, and Moon, and their Proportion one to another, is not onely to be obteined with Inſtrument, but by Eclipſes, eſpecially of the Sun, ſeeing that ſometime its totall, and again ſometime partile, albeit the viſible Conjunction of the Luminaries, be centuall. Laſtly, ſeeing the true and apparent Semidiameters of the Luminaries may (notwithſtanding the intervention of the Cauſes before ſpoken of) be truly obteined, wee ſhall not retard your longing expectations with any tedious Preamble, but briefly come to ſhew you how to enquire and ſearch out the true magnitude of theſe Bodies, and their Proportions mutually, ſo neer as the Capacity of weak man, can by this Art determine.

1	Cube of the ☉ Semidiameter	478.5 is	109558436.625.
	Cube of the Earths Semidiameter	68.5 is	321419.125.

Now dividing the Cube of the Suns Semidiameter by the Cube of the Earths Semidiameter, we ſhall finde it conteined therein $340\frac{2159}{3214}$ times, and therefore the Sun is ſo many times greater then the Earth.

2	Cube of the ☉ Semidiameter	478.5 is	10958436.625.
	Cube of the ☾ Semidiameter	19.1½ is	7022.735.

Making diviſion, as before, we ſhall finde the Cube of the ☾ Semidiameter, to be conteined in the Cube of the ☉ Semidiameter $15600\frac{37149}{70227}$ times.

3	Cube of the Earths Semidiameter	68.5 is	321419.125
	Cube of the Moons Semidiameter	19.1½ is	7022.735.

Dividing, as before, the greater by the leſſer, wee ſhall finde the Cube of the ☾ to be conteined in the Cube of the Earth $45\frac{54}{70}$, and ſo many times is the Earth greater then the ☾.

From the Hypotheſis of *Ptolemie*, it followeth, that the ☉ is greater then the Earth 166 times, and that the ☾ is leſſer then the ☉ 6648.

Copernicus would have the ☉ to be greater then the Earth 162, and the ☾ to be leſſe then the ☉ 7000 times.

Tycho Brahe deprehends the ☉ to be greater then the Earth about 140 times, and the ☾ to be leſſe then the Earth 42 times.

C. S. Longomontanus obſerves, that the ☉ is bigger then the Earth 196 times, and that the ☾ is 10000 times leſſe then the ☉.

Lansbergius (comming neerer the truth) proves by Demonſtration that the ☾ is leſs then the Earth 45½ times, that the ☉ is greater then the Earth 434 *ferè*, and that the ☉ is greater then the ☾ 19770 times.

But none of theſe Magnitudes and Proportions are conſentaneous to truth, neither agreable to their own Hypotheſis, and therefore not to be credited.

But the late, famous and expert French-man *Bullialdus*, in the 2 Chap. of the 6 Book of his *Aſtronomia Philolaica*, proves that the Cube of the Earth is to the Cube of the ☾, as 13,824,000: to 300,753, and therefore the Earth muſt contein the ☾ $45\frac{29}{30}$ times.

2 That

2 That the ☉ is greater then the Earth 343 times.

Lastly, that the ☉ exceedeth the ☾ $15765\frac{102}{300}$ times, for according to this demonstration the Cube of the ☉ is 4,741,632,000, and the Cube of the ☾ is 300,763.

CHAP. XXVI.

Of the Magnitude and Proportion of the five Planets Saturn, Jupiter, Mars, Venus, *and* Mercury.

Although it be a matter of great labour and difficulty to obtein the apparent Diameters of the Planets and Stars with Instrument, in respect of the Connexion of the Causes before mentioned, yet have I (with all the heed and circumspection I could possible) endevoured to remove the same, to finde out their true appearances; and I shall here deliver nothing, but that which observation hath for many years together confirm'd unto me.

		′	″
The apparent Semidiameters of these five Planets in their mean Distance from the Earth represented in the following Figure by the angle H D R.	♄	0	32
	♃	0	57
	♂	0	25
	♀	0	48
	☿	0	29.

Now, some perhaps, there may be, that may here accuse me of errour, sith *Tycho*, and other famous Authours make their apparent Semidiameters (in their mean distance) far greater, to which I answer, that the Circum-radiancie and Periwigge of their beams, making them appear greater then they are, did thereby deceive the Observators, as they who make Observation with the Galilean Glasse will acknowledge.

To finde the true Semidiameters of the Planets.

In the annexed Scheme, let P R S represent the Globular body of any of the five Planets, H R the Semidiameter, D the Earth, and D H the Distance between the Planet and the Earth. These things premised, we come to practise. Therefore in the Triangle D H R is given.

1 D H, the Distance of a Planet from the Earth.

2 The angle H D H, the apparent Semidiameter.

Hence the true Semidiameter H R or H S may thus be obteined.

In ♄.

Radius 90^d,	10,000000
Tangent of angle H D R 0′ 32″;	6,187682
D H 952500,	5,978865
H R 147 *fere*:	2,166547

In ♃.

Radius 90^d,	10,000000
Tangent of the angle H D R 57″;	6,439972
D H 522000,	5,717671
H R 144:	2,157643

In ♂.

Radius 90^d,	10,000000
Tangent of H D R 25″;	6,074651
D H 152200,	5,182415
H R 18:	1,257066

In ♀.

Radius 90^d,	10,000000
Tangent of H D R 48″;	6,365163
D H 100000,	5,000000
H R 23:	1,365163

In ☿.

Radius 90°,	10,000000
Tangent of the angle HDR 29″;	6,145087
DH 100000,	5,000000
HR 14:	1,145087

Of the Magnitude and Proportion of the Planets to the Earth.

According to the 18 Propoſition of the 12 Book of EUCLIDS Elements of Geometrie, a Sphære, or a Globe bears a triple Proportion to its Diameter, or to its Semidiameter, according to the 19 of the 5 Book: *Nam ut totum ad totum, ita ablatum ſe habuerit ad ablatum.* Therefore, as the Cube of the Semidiameter of the Earth, is in proportion to the Cube of the Semidiameter of the Starre, the ſame Proportion bears the Globe of the Earth, to the Globe of the Starre,

To finde their Magnitude and Proportion to the Earth.

It is no more but to ſeeke how many times the Cube of the one is conteined in the Cube of the other.

♄ { Cube of ♄ Semidiameter 147 is — 3176523
Cube of the Earths Semid. $68\frac{1}{2}$ is — 321419

Dividing the Cube of ♄ by the Cube of the Earth, the Quotient will be $9\frac{283}{321}$, and ſo much is ♄ greater then the Earth.

♃ { Cube of ♃ 144 is — 2985984
Cube of the Earth $68\frac{1}{2}$ is — 321419

Making Diviſion, as before, the Quotient will be $9\frac{932}{32141}$, which is the quantity ♃ exceeds the Earth.

♂ { Cube of the Semid. of the Earth $68\frac{1}{2}$ is — 321419
Cube of the Semidiameter of ♂ is — 5832

Dividing the greater by the leſſer, we ſhall finde that ♂ is leſſer than the Earth $55\frac{66}{583}$ times.

♀ { Cube of the Earths Semidiameter $68\frac{1}{2}$ is — 321419
Cube of ♀, her Semidiameter 23 is — 12167

And becauſe the Cube of ♀ is conteined in the Cube of the Earth $26\frac{5077}{12167}$, it ſhewes that ♀ is ſo many times leſſe than the Earth.

☿ { Cube of the Earth $68\frac{1}{2}$ — 321419
Cube of ☿ 14 — 2744

By making partition as before, wee ſhall finde that ☿ is leſſe than the Earth $117\frac{371}{2744}$ times.

CHAP. XXVII.

Having the true Semidiameter of a Planet, and his Diſtance from the Earth to finde his apparent Semidiameter.

IN the 26 Chap. preceding, I have according to my own proper Obſervations, ſet down the true Semidiameters of the Sun, Moon, and other Planets, and have ſhewed in the former Chapters, how that at any time given, you may compute their Diſtance from the Center of this earthly Globe, with much certainty (be they poſited in any part of their Orbs;) it cannot therefore be unſeaſonable now to treat a little of their apparent Magnitudes, becauſe I would not have any thing left wanting, or obſcure that may be thought neceſſary, or pertinent, and although the judicious need no farther Directions, then I have given in the 22 Chap. where I have treated of the apparent Semidiameters of the Sun, and of the Moon, his Siſter, yet ſhall I here in the other Planets make further illuſtration, by adding Examples.

In ♂.

When ♂ is in his mean Distance from the Earth, which conteins 152040 parts, his apparent Semidiameter is 25″, but being either neerer, or farther distant from the Earth, his apparent Semidiameter is increased, or diminished, accordingly, as all the other Planets are, for the neerer the Object is, the greater doth it appear, and so the lesser when it is far distant, as appears by the Opticks. Now suppose the Distance given of ♂ from the Earth be 56240 parts, and his apparent Semidiameter in that distance be required. His true Semidiameter according to the 26 Chap. is 18 parts, which known, I repair to the former Diagram of the 26 Chap. where we have given, (1) the Distance of ♂ from the Earth, represented by the line D H, 56240: (2) the true Semidiameter of ♂, H R 18. Hence to finde the angle of his apparent Semidiameter, H D R, I say,

As D H 56240,	4,750045
To H R 18;	1,255272
So the Radius 90^d,	10,000000
To the Tangent of the angle H D R 1′ 6″:	6,505227

Which 1′ 6″ is the apparent Semidiameter of ♂, and therefore his apparent Diameter is at the same time 2′ 12″.

In ♀.

Again, suppose ♀ be from the Earth 44100, and her apparent Semidiameter be required: having therefore her Distance, and her true Semidiameter, according to the 26 Chap. 23$\frac{1}{7}$, the Analogie will be the same as before, for in the same Figure I say,

As D H 44100,	4,644438
To H R 23$\frac{1}{7}$;	1,365588
So the Radius 90^d,	10,000000
To the Tangent of the angle H D R 1′ 48″:	6,721150

Therefore the Semidiameter apparent in the Distance given is 1′ 48″, and her Diameter apparent 3′ 36″, whereas her Diameter apparent in her middle Distance is but 1′ 36″, so that in the given Distance, her Semidiameter exceeds the mean 2′, and therefore it is, that when she is in this Distance, and neer to the Earth, she hath been oftentimes taken for a Comet, as in 1630, and in 1649, when being Occidentall, she appeared of unusuall magnitude, to the admiration of the Beholders, who were ignorant of the cause thereof.

CHAP. XXVIII.

Having the Distance of Sun, Moon, *or other Planets from the* Earth, *how to reduce the same into* German *or* Italian *miles.*

THe true Semidiameter of the Earth in German miles is 859$\frac{1}{2}$ *fere*, accounting the Circumference 5400, but we shall here account 860, according to common Computation, then looke what Analogie 68$\frac{1}{7}$, (which is the true Semidiameter of the Earth in our Numbers) bears to 860, the same Proportion bears the Distance of the Planet given in our Numbers, to the Distance in miles required.

Admit ♄ be in his mean distance from the Earth, where he is 952500 parts distant and it be required to reduce the same into German miles, I therefore multiply the Semidiameter of the Earth in miles, *viz.* 860, by the Distance given 952500, and the Product 819150000, I divide by 68$\frac{1}{7}$, and I find in the Quotient 11958394$\frac{14}{61}$, and so many German miles is ♄ distant from the Earth, when he is in his mean distance, then if you would reduce these German miles into Italian, or English miles, it is no more but to multiply the number of German miles given, by 4, (because one German mile make four Italian miles) and the Product comming of that Multiplication, wil be the distance

distance in Italian miles, which are in a manner the same our English miles are. As in this example, the distance given in German miles is 11958394 which multiplied by 4, procreates 47833576, and so many Italian miles is he from the Earth in his mean Distance.

After the same manner may the Distance of any of the other Planets be obteined, either from the Sun, or from the Earth, having their Distances given in such parts, whereof the Radius of the Earths Orbe is 100000, which must be enquired according to the Doctrine of Triangles, as appears in sundry Chapters of this Book, where I have plainly declared how their Distances in such parts may be found, either from the Sun, or from the Center of the Earth at any time proposed.

CHAP. XXIX.

Of the Eclipses of the Sun *and* Moon, *to calculate their Quantity, and to finde the Minutes of Incidence and Emersion Trigonometrically.*

It is not my intention here to treat methodically of the Eclipses of the Sun and Moon, in regard that Task belongs properly to the fourth Book, where we handle their motions and passions more succinctly then here is, or can be done, yet I shall briefly here, so far as appertains to the Theorique part thereof, give you the Fundamentalls of what I shall there deliver.

To calculate the quantity of the Moons *Eclipse.*

In the Eclipse of the Moon to be 1653, March $3^d\ 15^h\ 52'\ 39''$, the Semidiameter of the Moon is $15'\ 38''$, and the *Pars deficiens* $48'\ 45''$, therefore I say,

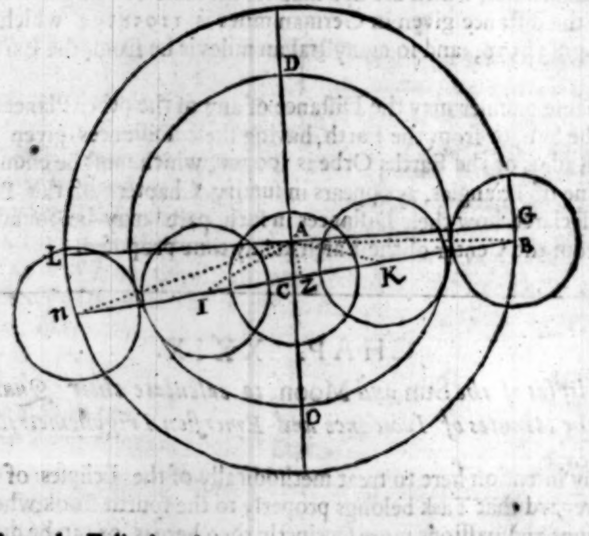
As the Diameter of the Moon $31'\ 16''$ (or $1876''$)	3,273233
To 12 Digits (or $720'$)	2,857332
So is $48'\ 45''$ (or $1925''$)	3,466126
To $18^d\ 42'\ 36''$ (or $1122\frac{36}{60}$)	3,050225

Again, in the Eclipse of the Sun to be 1654 August $2^d\ 8^h\ 55'\ 14''$ *A. M.* the apparent Semidiameter of the Sun is $16'\ 14''$, and the *Pars deficiens* $27'\ 6''$, *Ergò*,

As the Diameter of the ☉ $32'\ 28''$ (or $1948''$)	3,289589
To 12^d (or $720'$) ———	2,857332
So the *Pars deficiens* $27'\ 6''$ (or $1626''$)	3,211120
To $10^d\ 0'\ 59''$ (or $600''\frac{59}{60}$)	2,778863

To finde the minutes of Incidence and Emersion, as also the Minutes of the half tarrience of the Moon, *in the shadow of the* Earth.

For the more full understanding hereof, I have set down the two following Schemes, the former whereof serves for the ☾ Eclipse, and the latter for the ☉ Eclipse, wherefore in the former observe, that,



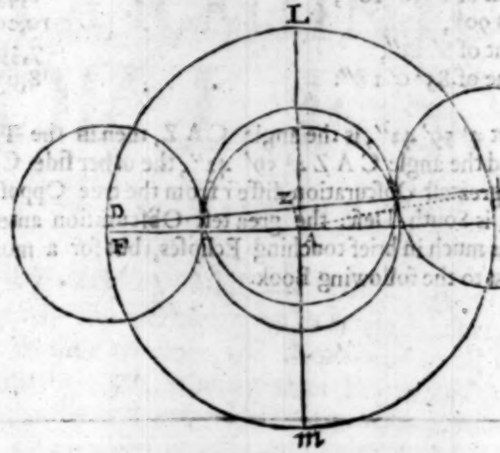
G A L, represents the Ecliptique.
B K C I N, the way of the ☾.
B K, the minutes of Incidence.
I N, the minutes of Emersion.
K Z, the minutes of her halfe tarrience in the shadow.
B Z, the minutes of Incidence and half tarrience together, being equall to Z N.
Hence in the Rectangle Triangle A Z B is known.
1 The Latitude of the ☾, 8′ 13″ (or 513″) understood by the side A Z.
2 the Hypothenuse, B A, the summe of the Semidiameters of the ☾, and the shadow 57′ 18″ (or 3438″)
Then according to the 1 Book 2 Chap. is given B Z 56′ 40″, and K Z 24′ 35″.

Hypothenuse A B	3438		
Side A Z	513		
Summe	3951	—	3,596707
Difference	2925	—	3,466126
		Aggregate	7,062833
Side B Z 56′ 40″ (or 3400″)		Semiaggr.	3,531416.

Then in the Triangle A Z K is known,
1 The Hypothenuse A K, the Difference of the Semidiameter of ☾ and shadow 26′ 2″.
2 The side A Z, the Latitude of the ☾ 8′ 13″.
Hence the side K Z is thus found.

Hypothenuse A K	1562		
Side A Z	513		
Summe	2075	—	3,317018
Difference	1049	—	3,020775
		Aggregate	6,337793
Side Z K 24′ 35″ (or 1475″)		Semiaggr.	3,168896.

The minutes of Insidence and half tarrience together are 56′ 40″, and the minutes of her half tarrience in the shadow 24′ 35″, which being taken out of 56′ 40″, leaveth B K 32′ 5″, which are the minutes of Incidence.



In the ⊙ Eclipse before mentioned to be 1654 *August* 2, the Summe of the Semidiameters of the ⊙ and ☾ is $32'\,46''$ (represented in the adjunct Diagram by the side B A) and the Latitude of the Moon seen (understood by Z A) is $5'\,40''$.

Therefore in the Rectangle Triangle B Z A, having A B, and A Z given, the side B Z will be found to be $32'\,16''$.

For the Analogie is as before.

Summe of the Semidiam. ⊙ and ☾, A B	1966		
Latitude of the ☾ seen A Z	340		
Summe	2306		3,36286
Difference	1626		3,21112
		Aggregate	6,57398
Minutes of Incidence B Z $32'\,16''$ (or $1936''$.)		Semiaggr.	3,28699

CHAP. XXX.

Of the Reduction of time from the true ☍, or ☌ ⊙ ☾, to the greatest Obscuration.

THe true or apparent ☌ or ☍ ⊙ ☾ differeth sometime (though not much) from the greatest Obscuration, for one cause thereof is the difference of the place of the ☾ in her Orbite from her place in the Ecliptique, which ever differ, unlesse the ☾ be in her Nodes or Quarters, the other ariseth from the inclination of the way of the ☾ to the Ecliptique, when she is in the shadow of the Earth.

As in the former Figure of the ☾ Eclipse, the Latitude of the ☾ A C is $8'\,3''$ *S. D.* and her distance from her Node $1^d\,38'\,10''$, therefor her Reduction is $24''$ to be substracted from her place in her Orbite, and so much is the ☾ from the true ☍ ⊙, which divided by the hourly motion giveth $53''$ to be added, so that the true ☍ ⊙ ☾, is $15^h\,54'\,17''$. But how the greatest Obscuration differeth from the true Opposition, I shall here shew. In the Figure of the ☾ Eclipse the line C L represents the Ecliptique, which cuts the line D O with right angles in the point A, which is the opposite point to the ⊙, but the line B Z N is the way of the ☾, and because her latitude is $8'\,33''$, and her Distance from her Node $1^d\,38'\,10''$, the angle A C Z will be $85^d\,0'\,18''$, for,

As the Tangent of $1^d\ 38'\ 10''$,	8,455808
To the Radius 90^d,	10,000000
So the Tangent of $8'\ 33''$,	7,395675
To the Co-sine of $85^d\ 0'\ 18''$:	8,939867

Whose Complement $4^d\ 59'\ 42''$, is the angle C A Z, then in the Triangle C A Z, having A C $8'\ 33''$, and the angle C A Z $4^d\ 59'\ 42''$, the other side C Z will be $45''$, and so much doth the greatest Obscuration differ from the true Opposition, and because the latitude of ☾ is South Desc. the greatest Obscuration antecedes the true Opposition. And thus much in brief touching Eclipses, but for a more methodicall Docteine, I referre you to the following Book.

The end of the third Book.

HARMONICON COELESTE:

The Fourth Book.

Conteining the practicall part of *Astronomie*, or Doctrine of the Second Motions: Wherein is conteined new Tables of the Middle Motions and Æquations of all the Planets, with their use, whereby their Equall and Apparent Places may speedily be acquired and found out to any time, either past, present, or to come.

Calculated (by the Theorie of the Author,) according to the Doctrine of the Third Book, And compared throughout with the admired Observations of that Noble *Dane* TYCHO BRAHE.

The Radix of the Middle Motions being accommodated to the Meridian of the most famous City of LONDON:

		d	′
Whose	*Longitude* is	21	00
	Latitude is	51	32

By Vincent Wing, *Mathemat.*

Cœli enarrant gloriam Dei fortis, & opus manuum ejus indicat expansum eorum. Psal. 19. vers. 2.

LONDON:
Printed by Robert Leybourn, for the Company of Stationers, 1651.

HARMONICON COELESTE:

The Fourth Book:

In this 4th book is plainly & clearly taught how to calculate ye motions of ye planets both in longitude & latitude for ... as this ...

CHAP. I.

Of the Epocha *or* Radix *of the middle motions of the* Planets *and* Stars, *and of the* Æquation *of time for the* Difference *of* Meridians.

FOrasmuch as all Astronomers in their Tables do ever apply the Radix or Epocha, of the middle motions to some certain and definite Meridian, passing over the Superficies of the Terrestiall Sphære, as also account their equall Courses and Revolutions from some known point of time, wherein some memorable event hath happened, as from the Creation of the World, from the Floud, from the Birth of Christ, or from the death of some great Prince, as *Nabonnassor*, *alias Nabuchodonosor*, *Alexander*, *Julius Cæsar*, and others. But our Tables of the Cœlestiall motions take their beginning from the Meridian of the first day preceding the Calends of January next following after Christs Nativity, and are accomodated to the Meridian of the famous City of *London*, whose Longitude is 21 degrees, reckoned from the Canarie, or Fortunate Ilands, scituate in the West, from which all Geographers, do number the Longitudes and Meridians of Cities and Places upon the Earth, therefore those places then, that are scituate under the Meridian of *London*, have no need of this Æquation for the difference of Meridians, but they who live under other Meridians, cannot use our Tables aright, except they first æquate the time for the said difference: for they who are removed from the Meridian of *London* towards the *East*, number more houres in the Observation of the appearance of the Cœlestiall Bodies, then those do at the same moment who are more *West*, because, that when the Sun is in our Meridian, it is removed from theirs towards the *West*, and therefore if the place be *East* of *London*, adde to the time given, but if it be *West*, make Substraction, according to the difference of Longitude, allowing 15^{d} to an hour, and 4$'$ to a Degree, so will the Summe, or Difference be the time æquated to the Meridian of *London*. But because the Reader may speedily make the said Reduction, I have added a Catalogue of many of the chiefest Cities in divers Regions, having set down the Latitude and difference of Meridians in time, together with the notes of Addition and Substraction, which known, observe.

1 If it be required to reduce the time given under the Meridian of *London*, to some other Meridian, seek the place desired in the Catalogue of Cities, and the Difference of time there found, either adde, or substract to or from the time given at *London*, according as the titles of Addition and Substraction shew, for so will the time be reduced to the Meridian of the other place, that was required.

2 If the time given, be under some other Meridian, its then requisite (that the middle motions may aright be obteined) to reduce the same to the Meridian of *London*, and therefore seeke the Place given in the Catalogue of Cities, and the difference of time there found, contrary to the Title, is to be added, or substracted from the time there given.

EXAMPLE 1. Suppose the time given of the middle of the Moons Eclipse be at *London*, at 10 0′ *P. M.* and it is required to reduce the same to the Meridian of *Uraniburge*, I therefore seek *Uraniburge* in the Catalogue of Cities and Places, against which I finde 50′ with the letter A annexed, therefore I conclude, that the middle of the Eclipse, which was observed at *London*, at 10h 0′ *P. M.* was seen at *Uramburge* at 10h and 50′ *P. M.*

EXAMPLE 2. Suppose the middle of the same Eclipse had been observed at *Uraniburge* at 10h 50′, and I would then know at what hour and minute the same happened in the Meridian of *London*. Against *Uraniburge* (as before) I finde 50′ A, therefore, contrary to the Title, I substract 50′, and the Residue 10d 0′ is the middle of the Eclipse in the Meridian of *London*.

CHAP. II.

To Calculate the true place of the Sun.

First, by the Table entituled [A Table of the middle motion of the Sun] compute the middle motion of the Sun, and his Apogæon, by adding into one Sum the Numbers belonging to the Year, Moneth, and Day given.

2 Substract the Apogæan from the middle Longitude of the Sun, and the Residue will be the simple Anomalie.

3 With the simple Anomalie of the Sun, enter the Table of the Prosthaphæresis or Æquation of the ☉, finding the Signe in the Head of the Table, and the Degree in the first Column on the left hand, when the ☉ Anomalie is lesse then 6 Signes, but when greater then 6, enter with the Signe in the bottome of the Table, and with the Degree in the first Column on the right hand, and in the common angle is the absolute Æquation of the ☉, to be added to, or substracted from, the middle motion of the ☉, according to the Titles adde, or substract.

EXAMPLE. Let the time proposed be the 10 of March 1652, at noon, at which time the ☉ Place is to be enquired. First, I enter the Table of the middle motion of the ☉, finding the next lesser summe to the Year proposed, *viz.* 1601, and set down the middle motion agreeing thereunto. Secondly, because there is yet wanting 51 Years, I take the next lesser summe in the Table, entituled [A Table of the annuall motion of the ☉, &c.] which I finde to be 40, and the middle motion of the ☉ agreeing thereunto towards the right hand, I subscribe under the former Summe, and because there is yet remaining 11 Years, I again enter the said Table, finding the number given, and excerpt the middle motions as before. Lastly, I take in like manner, the middle motions belonging to the Moneth, Day, and Hour, and place them in Order, as before, which done, I adde the severall Summes so disposed into one, and the Aggregate is the middle motion required, as the following Synopsis manifests.

		Longit. ☉				Apog. ☉			
Time given		S	D	′	″	S	D	′	″
Years	1601	9	19	58	34	3	5	43	28
	40	0	0	17	57			41	5
	11	11	29	20	35			11	18
March		1	29	8	19				10
D	10	0	9	51	23				3
Middle motion of ☉		11	28	36	48	3	6	36	4

March 10. 1652 at noon.

Now

Now that the simple Anomalie may be known, I substract the Apogæon of the ☉ from his middle motion, and the Residue is the Anomalie desired $8^s\ 22^d\ 0'\ 44''$, with which I enter the Table of the Æquation of the Sun, (always taking the proportionall part if need require) and I finde the Æquation $2^d\ 2'\ 3''$ under the title *Adde*, therefore I adde the said Æquation, to the Suns middle motion, and the Aggregate $0^s\ 0^d\ 38'\ 51''$ is the Suns true place that day at noon.

Another Example for Practise.

The 15 of *July* 1610, at $3^h\ 30'$ *P. M.* the ☉ place is required,

PRAXIS.

	Longitude ☉				Aphel. of ☉.				
Time given	*S*	*D*	*'*	*''*	*S*	*D*	*'*	*''*	
Years 1601	9	19	58	34	3	5	43	28	
9	11	29	49	15			9	15	
July	5	28	44	7				31	
D. 15		14	47	5				2	
Hou. 3			7	24					
Min. 30			1	14					
Middle Longitude of the Sun:	4	3	27	39	3	5	53	16	*Aphelion of the Sun.*
Aphel. of the Sun Substract.	3	5	53	16					
Rests the Anomalie of the Sun:		27	34	23					
Æquation substract.			55	44					
True place of the Sun:	4	2	31	55					

And therefore the true place of the ☉ from the Earth is $2^d\ 31'\ 55''$ ♌, and the place of the Earth from the Sun in the opposite point, *viz.* in $2^d\ 31'\ 55''$ ♒.

To finde the co-æquate Anomalie of the Sun, *and his Distance from the* Earth.

First, that the co-æquate Anomalie of the Sun, and his Distance from the Earth may be had, enter the Table of the Æquation of the Sun, and in their proper Columns is our desired Numbers. As in the last example, the simple Anomalie is $0^s\ 27^d\ 34'\ 23''$, and therefore his Anomalie co-æquated $0^s\ 27^d\ 5'\ 33''$, and his Distance from the Earth 101601.

But in the other Example, where the simple Anomalie is $8^s\ 22^d\ 0'\ 44''$, I take the Complement of the Anomalie co-æquated, *viz.* $3^s\ 6^d\ 58'\ 34''$, which being subducted from 12 Signes, leaveth $8^s\ 23^d\ 1'\ 26''$, which is the co-æquate Anomalie desired.

In like manner, is the co-æquate Anomalie, and Distance of the other Primarie Planets from the Sun, to be found by their Tables.

CHAP. III.

The true place of the Sun *being given, to reduce the Middle Time into the Apparent, and contrariwise.*

THE In-æquality of naturall Dayes ariseth from the difference of the Right Ascensions of the Æquinoctiall, and Zodiaque, and from the Inæquality of the Daily Revolutions of the Earth about her Axis, as I have shewed in the preceding Booke, both which Æquations arising from the said Arches, is digested into one Table, for more speedy obteining thereof. Now that you may finde the Æquation of civill, or naturall dayes, enter the said Table, finding the Signe of the ☉ place on the Head, and the Degree on the left side, the common angle will shew the said Æquation in minutes and seconds, which according to the titles A and S, must be added to, or substracted from, the equall time given, that it may be made apparent, But the contrary title is to be observed, when the apparent time is to be reduced to the equall.

EXAMPLE. The equall time given is 1610, *July* 15^{d} 3^{ho} 30′ *P. M.* the ☉ is then in 2^{d} 31′ 55″ ♌, which entred in the said Table, giveth in the common angle 7′ 21″ to be substracted; this therefore being substracted from the middle time given, leaveth the apparent 3^{h} 22′ 39″.

CHAP. IV.

To calculate the true motion of the Moon *in Longitude for any time assigned.*

FIrst, the place of the Sun is to be calculated to the time given, according to the Doctrine of the second Chap.

2 The middle motion of the Moon, and her Aphelion, are to be sought as is before shewed.

3 By substracting the motion of the Aphelion from the middle motion of the Moon, the Residue will be the simple Anomalie of her Orbite.

4 With the simple Anomalie of the Moon, enter the Table of the Absolute Æquation of the first inæquality of the Moon, and you shall in like manner, as in the other Planets, obtein her absolute Æquation (as in relation to her own Orbite) which is to be added to the middle motion of the Moon, and also to her simple Anomalie, or to be substracted from the same, according to the Titles.

5 The distance of the Moon from the Sun is found by suducting the true place of the Sun, from the place of the Moon thus æquated, with which Distance, and the Anomalie of the Moon æquated, enter the Table of her Reflection and Variation, finding the Distance of the ☾ from ☉ in the Front of the Table, from ☌ or ☍ to □, and the Anomalie æquated in the first Column descending on the left hand: but enter with the Distance of the ☾ from ☉ in the bottome of the Table from her □ to ☌ or ☍, and with her Anomalie æquated in the first Column ascending on the right hand, (as the titles demonstrate) and in the common angle is the true Æquation of her second inæquality, either to be added to, or substracted from the feigned place of the Moon, before found, that it may be exact and absolute.

EXAMPLE. At the time of *Tycho's* Observation 1587 Ho. 19 22′ 36″ *P. M*, the true place of the Moon is required: I therefore in the first place substract 50′ for the difference of the Meridians of *London* and *Uraniburge*, and the Residue 18^{h} 32′ 36″ is the true time at *London*, at which time the ☉ is in 4^{d} 5′ 47″ ♍, which known, the calculation is to be fram'd as followeth.

Middle Motions of

	☾				*Aphel.* ☾.				*Node Asc.* ☾.				
Time given.	S	D	′	″	S	D	′	″	S	D	′	″	
Years 1501	1	29	44	49	3	29	42	39	1	25	46	11	*Radix.*
80	5	24	14	56	0	15	26	16	3	17	20	54	
6	2	9	28	49	8	4	6	8	3	26	1	25	
August.	9	3	23	44	0	23	37	8	0	11	13	35	
Day 17.	7	13	59	55		1	53	38			54	1	
Hour. 18.		9	52	56			5	1			9	53	
Min. 32.			17	34				9				17	
Sec. 36.				20				0				00	
Middle motion of ☾.	3	1	3	3	1	14	50	59	7	25	40	9	Substract fro Radix
Aphelion ☾ *substra.*	1	14	50	59					6	0	6	2	Node Asc. ☾.
Anomalie of the ☾.	1	16	12	4									

The Anomalie of the Moon giveth the Prosthaphæresis, or Æquation of the first Inæquality 3^{d} 27′ 59″ to be substracted, and therefore the place of the Moon first æquated is 27^{d} 35′ 4″ ♊, and her Anomalie æquated 1^{s} 12^{d} 44′ 5″.

The

The Distance of ☾ from the ☍ ☉, is $3^{s}\,23^{d}\,29'\,17''$.

With this Distance, and the Anomalie of the Moon æquated, I enter the Table of the Moons Æquation, entituled, (*A Table of Reflection and Variation, &c.*) and because the Moon vadeth from □ towards ☌, I number the Anomalie æquated in the last Row, and the Distance of the ☾ from ☉ in the Foot or Bottom of the Table, and in the common angle (by making proportion for the intercepted Degrees) I finde the Æquation $1^{d}\,12'\,17''$ *S.* which, according to the Title, I substract from the place before æquated, and so her true place co-æquated is $26^{d}\,22'\,47''$ ♊, agreeing to the Observation of *Tycho*, and the account of Triangles, as is set forth in the former Book.

CHAP. V.

To compute the true Latitude of the Moon, *and to reduce her place from her Orbite to the Ecliptique*, & contra.

HAving found the true motion of the Moon by the former Chapter, subduct from the same, the motion of her Node Ascend. and the Remainder will be the æquated motion of the Moons Latitude.

Then with the æquated Distance of the ☾ from ☉ enter the Table of the proportionall minutes of the Moons Latitude, and take out the proportionall minutes adhering thereunto.

Thirdly, with the æquated motion of the Moons Latitude, the Table of her Latitude is to be entered, and the Latitude to be taken, with the Excesse, whose proportionall Part must be extracted by the Minutes of Proportion.

EXAMPLE. By the former Chap we found the true motion of the Moon to be $2^{s}\,26^{d}\,22'\,47''$, and the motion of her Node Ascending $6^{s}\,0^{d}\,6'\,2''$, which I deduct from the Moons place, and the Remainder $8^{s}\,26^{d}\,16'\,45''$ is the æquated motion of the Moons Latitude.

The Distance of the ☾ from the ☉, is $3^{s}\,23^{d}\,29'\,17''$, and therefore the Proportionall minutes are $50'\,29''$.

With the æquated motion of the Moons Latitude, I enter the Table of Latitude, and there I finde her Latitude $4^{d}\,59'\,21''$, with Excesse $16'\,57''$, of which I take the proportionall Part by the Sexagenarie Table, after this Analogie.

As $60'$, to $16'\,57''$: so is $50'\,29''$, to $14'\,15''$.

50	29		
13	20		
	47	30	
	7	44	
		27	33
14	15	41	33

Which $14'\,15''$ being added to her Latitude $4^{d}\,59'\,21''$, giveth the true Latitude of the Moon $5^{d}\,13'\,36''$ South, agreeing to observation.

The Reduction of the Moon from her Orbite to the Ecliptique is thus to be sought. With the æquated motion of the Moons Latitude, enter the Table of the Reduction of the Moon from her Orbite to the Ecliptique, and the Reduction there found, Adde, or Substract, to or from the true place of the Moon in her Orbite, according as the title directs; but the contrary title is to be applyed when her place is to be reduced from the Ecliptique to her Orbite.

EXAMPLE. The æquated motion of the Moons Latitude by the former work is found to be $8^{s}\,26^{d}\,16'\,45''$, with this I enter the Table, and I finde $55''$ to be substracted from the place of the Moon in her Orbite, and it leaveth the place of the Moon in the Ecliptique in $26^{d}\,21'\,52''$ ♊. And this was the true place of the ☾ at that instant, agreeing to the acurate Observation of *Tycho Brahe*.

Here is to be noted that both in this Paradigma, as also in that in the former Book, I have mentioned the middle time and the apparent, according to the Limitations of *Tycho Brahe*: and this I thought good to give the Reader notice of, lest *Momus* should

ſhould haſtily cenſure, and be ready to ſay (before he underſtands) that the middle time here uſed is not exactly reduced from the apparent according to my own Rules and Tables. If he (or any other) demand the Reaſon hereof, I anſwer, is it not moſt conſentaneous to reaſon we follow him who made the Obſervation, & left us both the middle and the apparent time thereof by his will? much more then when the thing it ſelf is ambiguous and doubtfull.

CHAP. VI.

To calculate the true motions of the three ſuperior Planets, Saturn, Jupiter, *and* Mars.

FIrſt, to the time given, compute the true motion of the Sun, and his diſtance from the Earth, according to the Doctrine of the ſecond Chap.

2 Gather the middle motion of the Planet, his Aphelion, and Node Aſcending, as before we taught.

3 Subſtract the Aphelion from the middle Longitude, and the Reſidue will be the ſimple Anomalie of the Excentrique.

4 With the ſimple Anomalie, enter the Table of the Æquation of the Planet given, in like manner as we before ſhewed in the ☉ and ☾, and there take the Æquation, together with his diſtance from the Sun, which note apart by it ſelf, as in the Examples following, but the Proſtaphæreſis or Æquation there found, is to be added to, or ſubſtracted from, the middle motion of Longitude, according as the titles direct; ſo will the ſumme or Difference, be the Excentrique place of the Planet, or his place from the ☉ in his Orbite.

5 From the place of a Planet thus found, deduct his Node Aſcending, and the Reſidue will be the Argument of Latitude, or Anomalie of the Inclination of his Orbite, with which entring the Table of Inclination, Reduction, and Curtation, you ſhall obtein the Inclination of the Orbite, the Reduction, and Curtation: the latter whereof, namely the Curtation, is ever to be ſubſtracted from their Diſtance from the Sunne in their Orbites. And here note, that the Curtations ſet down in the Tables is calculated to the mean diſtance of the Planet from the Sun, which may ſerve exact enough for his Diſtance at any time, but concerning the Reduction, obſerve the following Rule.

If a Planet depart or move from either Node, towards the limits of his greateſt Latitude, the Reduction is to be ſubſtracted from the place found in the Orbite: but if he depart from the Limit, and approach towards the Node, the Reduction is to be added, for ſo the Sum or Difference will be his true place in the Ecliptique.

6 From the true place of the Sun from the Earth, ſubſtract the Longitude of the Planet from the Sun in the Ecliptique, and the Reſidue will be the Anomalie of Commutation, whoſe halfe Summe, if the Anomalie be leſſe then 180^d, is the half Summe of the angles unknown, that is to ſay, the half of the angle of Elongation, and angle of Parallax, but if the ſaid Anomalie be greater then 180^d, then take for the ſaid number the half of the Complement to 360^d.

7 Having by the Table of Æquation found the Diſtance of the Planet from the Sun, and the Diſtance of the Sun from the Earth, with the half Summe of the angles before expreſſed, we may by the Canon of Artificiall Sines and Tangents, ſpeedily obtein the angle of Elongation, and Parallax of the Earths Orbe, according to the Doctrine of the firſt *Book*, 2 *Chap.* 9 §: for as the Logarithme of the Summe of the ſaid Intervalls, is in proportion, to their Difference; ſo is the Tangent of half the Summe of the angles unknown, to the Tangent of an Arch, which being added to the half Summe of the angles unknown, giveth the angle of Elongation, but being ſubſtracted, leaveth the Parallax of the Earths Orbe.

Finally, In the former Semicircle, where the Anomalie of Commutation is leſſe then 180^d, the Parallax of the Orbe is always to be added to the place of a Planet from the Sun, but in the latter Semicircle, when the ſaid Anomalie is greater then 180^d, and

and lesse then 360^d, the Parallax is to be substracted; for so will the Summe or Difference, shew the true place of a Planet from the Earth, as I shall more fully illustrate by the following Examples.

Example 1 *in* Saturn.

In the Year 1594 *December* 10. at 7^h 50′ *P. M.* noble *Tycho* observed ♄ in 24^d 30′ ♌ with Latitude 1^d 18′ North.

From the time given deducting 50′ for the Difference of Meridians of *London* and *Uraniburge*, the time at *London* will be 7^h 0′, at which time, by my Tables, the middle motion of ♄ is 4^s 14^d 18′ 8″ his Aphelion 8^s 25^d 51′ 53″, and his Node Ascending ☊, 3^s 20^d 28′ 51″, which being given, I then, from his middle motion, substract his Aphelion, and the Remainder 7^s 18^d 26′ 15″, is the middle Anomalie of the Excentrique with which Anomalie, J enter the Table of the Æquation of ♄, and J finde the Æquation corresponding thereto, to be 5^d 9′ 2″ with the Title *Adde*, also in the next Column towards the right hand, J take the Distance of ♄ from the ☉ to be 918744 (being such parts whereof the Radius of the Earths Orbe is 100000) which (as in the following worke) is to be noted apart, but the Æquation, J adde (according to the Title) to the middle Longitude of ♄, and the Summe is the true place of ♄ from the ☉ in his Orbit 4^s 19^d 27′ 10″.

Then J substract the Node Ascend. of ♄, from the place of ♄ thus found, and the Residue is the Anomalie of Latitude 0^s 28^d 59′ 19″, with which J enter the Table of Inclination, Reduction, and Curtation, where J finde his Inclination 1^d 12′ 53″ North, his Reduction 1′ 25″, and the Curtation 216, then according to the former Rule (because ♄ is going from his Node towards the Limit of his greatest Latitude) J substract the Reduction from the place of ♄ in his Orbite, and the Remainder 4^s 19^d 25′ 45″ is the true place of ♄ from the ☉ in the Ecliptique. Also from the Distance of ♄ from the ☉ before found 918744, J deduct the Curtation, and there rests 918528, which is the Distance Curtated.

Having also by the second *Chap.* found the place of the Sun to be 8^s 28^d 47′ 15″, with his Distance from the Earth 98242. I substract the place of ♄ from the place of the ☉, and there rests for the Anomalie of Commutation 4^s 9^d 21′ 30″, which bisected, giveth the half Summe of the opposite angles 2^s 4^d 40′ 45″ (or 64^d 40′ 45″) which known, to finde the Parallax of the Earths Orbe, &c. I take the Summe and Difference of the two laterall Distances, namely, of the distance of ♄ from the ☉ 918528, and of the Distance of the ☉ from the earth 98242, and J finde their Summe is 1016770, and their Difference 820286, from which (for facility of operation, and use of my Tables) J strike off the two last Figures towards the right hand, and then by the Canon of Logarithmes, J say;

As the Summe 10167|70,		4,007193
To the Difference 8202|86;		3,913920
So the Tangent of half the Summe of the unknown angles	64^d 40′ 45″,	10,325007
To the Tangent of	59 36 31:	10,231734
Angle of Elongation.	124 17 16	Aggregate.
Parallax of the Orbe.	5 4 14	Difference.

Finally, because the Anomalie of Commutation is lesse then the Semicircle 180^d, J therefore adde the Parallax of the Earths Orbe 5^d 4′ 14″, to the place of ♄ from the ☉, 4^s 19^d 25′ 45″, and the true place of ♄ from the Earth will be 4^s 24^d 29′ 59″, that is to say, in 24^d 30′ ♌, agreeing exactly to the Observation of noble *Tycho Brahe*.

The

The Operation in Saturn.

Time given.	Longit. ♄. s d ′ ″	Aphel. ♄. s d ′ ″	Node Af. ♄ s d ′ ″	
Years 1501	2 04 56 57	8 23 46 10	3 19 32 15	Place of the Sun, 28ᵈ 47′ 15″ ♐.
Years 80	8 18 46 40	0 01 47 04	48 12	
Years 13	5 09 02 34	17 24	7 50	Distance of the Sun fró the Earth. 98242
December.	11 11 16	1 13	33	
Day 10.	20 06	2	1	
Hou. 7.	35	0	0	
Middle Longitude of ♄	4 14 18 08	8 25 51 53	3 20 28 51	

	s d ′ ″
Aphelion substract.	8 25 51 53
Anomalie of Excent.	7 18 26 15
Æquation adde.	5 09 02
Place of ♄ from ☉.	4 19 27 10
Node Ascend. subst.	3 20 28 51
Rests.	28 58 19
Reduction substract.	1 25
Pla. ♄ from ☉ in Eclipt.	4 19 25 45
Place of the Sun.	8 28 47 15
Anomal. of Commut.	4 09 21 30
Halfe Summe.	2 04 40 45
Parallax of Orbe adde.	05 04 14
True place of ♄ from the Earth.	4 24 29 59
That is.	24 30 ♌

The Argument of Latitude, which gives the inclination 1ᵈ 12′ 53″ *North*, the Reduction 1′ 25″ *Substract*. and the Curtation 216.

918744 Distance ♄ from ☉ in his Orbe.
216 Curtation substract.

918528 Distance curtated.
98242 Distance of Earth from Sun.

Summe	10167	70	4,007193
Difference	8202	86	3,913920
Tangent of 64ᵈ 40′ 45″			10,325007
Tangent of 59 36 31			10,231734

Aggr. 124 17 16 Elongation.
Differ. 5 4 14 Paralla. of the Orb. ad.

The Operation in Jupiter.

In the Year 1591, *January* the 9th. in the morning, *Michael Mastline* and *John Kepler*, beheld (at *Tubing*) ♃ eclipsed by ♂: For the colour of ♂ was read and fiery, which argued ♂ to be the inferiour.

Time given.	Longit. ♃. s d ′ ″	Aphel. ♃. s d ′ ″	Node Asc. ♃ s d ′ ″	
Years 1501	0 04 24 51	6 06 14 10	3 05 04 20	Place of the Sun, 28ᵈ 46′ 24″ ♑.
Years 80	8 29 02 40	1 20 08	17 20	
Years 10	10 3 35 20	10 01	2 10	Distance of ☉ fró Earth. 98360
Day 08	39 54	3	0	
Hour. 17	3 32	0	0	
Middle Longitude of ♃	7 07 46 17	6 07 44 22	3 05 23 50	

	s d ′ ″
Aphelion substr.	6 07 44 22
Anomalie of Excentr.	1 00 01 55
Æquation substract.	02 38 27
Place of ♃ from ☉.	7 05 07 50
Node Ascend. substr.	3 05 23 50
Rests	3 29 44 00
Reduction adde.	25
Plac. ♃ fró ☉ in Eclipt.	7 05 08 15
Place of ☉	9 28 46 24
Anom. of Commutat.	2 23 38 09
Halfe Summe.	1 11 49 04
Parallax of the Orb ad.	9 59 08
True place ♃ fró Earth	7 15 07 23
That is in	♏ 15 07 23

Distance of ♃ from ☉ in his Orbite 544446.

The Argument of Latitude, which gives the inclination 1ᵈ 11′ 3″ *North*, the Reduction, 25″, and the Curtation 111 parts.

544446 Distance of ♃ from ☉ in his Orbite.
111 Curtation substract.

544335 Distance of ♃ Curtated.
98360 Distance of Earth from Sun.

Summe	6426	95	3,807941
Differen.	4459	75	3,649237
Tangent of 41ᵈ 49′ 04″			9,951658
Tangent of 31 49 56			9,792954

Aggr. 73 39 00 Elongation.
Diffe. 9 59 8 Paral. of the Orb.

The Operation in Mars.

Time given.	Longit. ♂. s d ′ ″	Aphel. ♂. s d ′ ″	Node Asc. ♂ s d ′ ″	
Years 1501	8 05 05 15	4 26 58 30	1 15 30 49	Place of the Sun, 28d 46′ 24″ ♑.
Years 80	6 13 19 52	1 37 12	58 8	
Years 10	3 23 54 16	12 9	07 16	
Day 8	04 11 33	2	01	Distance of the Sun frō the Earth. 98360
Hou. 17	22 16	0	00	
Middle Longitude of ♂	6 16 53 12	4 28 47 53	1 16 36 14	

Middle Longitude of ♂	6 16 53 12
Aphelion substract.	4 28 47 53
Anomalie of Excent.	1 18 05 19
Æquation subst.	7 15 49
Place of ♂ from ⊙.	6 09 37 23
Node Ascend. subst.	1 16 36 14
Rests.	4 23 01 09
Reduction adde.	50
Place ♂ frō ⊙ in Eclipt.	6 09 38 13
Place of the Sun	9 28 46 24
Anomal. of Commut.	3 19 08 11
Halfe Summe.	1 24 34 05
Parallax of Orbe adde.	1 05 30 40
True place of ♂ from the Earth.	7 15 08 53
That is.	♏ 15d 8′ 53″

Gives the Distance of ♂ from ⊙ in his Orbite. 162500.

The Argument of Latitude, which sheweth the Inclination 1d 6′ 46″ *North*, the Reduction 50″ Adde, and the Curtation 29.

162500	Distance of ♂ from ⊙ in his Orbite.
29	Curtation *Substract.*
162471	Distance of ♂ Curtated from the Sun.
98360	Distance of the Earth from the Sun.

Summe	2608	31	3,416307
Difference	641	11	2,806858
Tangent of	54d 34′ 35″		10,147823
Tangent of	19 3 25		9,538374

Aggr.	73	37	30	Elongation.
Differ.	35	30	40	Parallax of the Orbe.

CHAP. VII.

To calculate the motion of the two inferiour Planets, Venus *and* Mercury.

THe Praxis of the Calculation is in a manner the same as before in ♄ ♃ and ♂, onely differeth from them in the collation of the Prosthaphæresis of the Orbite, for in the superiour Planets, the Parallax of the Orbite is the angle at the Planet, but in the inferiour, its the angle at the Earth, which in the former Semicircle being added, and in the latter Semicircle substracted, to, or from, the place of the Sun, giveth the true place of the Planet required.

In the Year 1590 *October* 3d at 5h in the morning, *Michael Mæstlin* (at *Tubing*) observed ♂ eclipsed by ♀, for the colour of ♀ was bright, which shewed ♀ to be the the lower. *Mæstlin pag.* 519. *Epit. Astron.* and *Kepler Astron. Opt. pag.* 305.

For the difference of the Meridians of *Tubing* and *London*, is 36′ to be substracted, therefore at *London*, the time is 16h 24′, at which time the place of the ⊙ from the Earth is 19d 23′ 27″ ♎, and his distance from the Earth 99545. Also the place of ♂ is is 15d 31′ 40″ ♍, his latitude 1d 16′ 7″ North, and his distance from the ⊙ curtated 166503. The place of ♀ is then required.

A Type of the Operation in Venus.

	Longit. ♀ s d ' "	Aphel. ♀ s d ' "	Node Asc. ♀ s d ' "
Time given Years 501	5 01 30 34	10 2 53 09	2 11 59 24
80	0 15 29 13	1 12 01	48 00
9	7 16 20 30	8 06	5 24
October	2 17 23 37	41	27
Day 02	3 12 16		
Hour 16	1 04 05		
Min. 24	1 36		
Middle Longitude of ♀	3 25 01 51	10 4 13 57	2 12 53 15
Aphelion substr.	10 4 13 57		
Anomalie of Excentr.	5 20 47 54		
Æquation substract.	7 41		
Place of ♀ from ☉.	3 24 54 10		
Node Ascend substr.	2 12 53 15		
Rests	1 12 00 55		
Reduction subst.	2 58		
Plac ♀ frō ☉ in Eclipt.	3 24 51 12		
Place of ☉ substract.	6 19 23 27		
Anom. of Commutat.	9 05 27 45		
Halfe Summe.	1 12 16 07		
Parallax of the Orb sub.	1 03 52 50		
True place ♀ frō Earth.	5 15 30 37		
That is in	♍ 15 30 37		

Place of the Sun, $19^d\ 23'\ 27''$ ♎.

Distance of ☉ frō Earth. 99545

Distance of ♀ from ☉ in his Orbite 71812.

The Argument of Latitude, which gives the inclination of her Orbe, $2^d\ 15'\ 44''$ *North*, the Reduction $2'\ 58''$ sub. and the Curtation 56.

71812 Distance of ♀ from ☉ in her Orbite
56 Curtation substract.

71756 Distance of ♀ from ☉ Curtated.
99545 Distance of Earth from Sun.

Summe	171301	4,233757
Differen.	27789	3,443888
Tangent of $42^d\ 16'\ 07''$		9,958532
Tangent of 08 23 17		9,168663
Difference 33 52 50 Paral. of the Orb		

A Type of the Operation in Mercury.

Anno 1631, upon the 28^{th} of *October* Old Stile, or the 7^{th} of *November* New Stile, *Monsier Gassendus* (by helpe of a Telescope) observed a Conjunction of the ☉ and ☿, for at 9 before noon he came upon the Sun, and at $10^h\ 28'$ he was observed towards the South-East part of the ☉ shadow (as it shewed it selfe to his view upon a white paper held behinde the Telescope) whereby it may be gathered, that in the Heavens he was placed towards the North-West part of his body. Now how my Tables represent this famous Observation, I shall here examine.

For the difference of Meridians of *London* and *Paris*, is to be substracted 10', the time therefore in the Meridian of *London* is $10^h\ 18'$, at which time, according to my Tables, the true place of the ☉ is $14^d\ 43'\ 35''$ ♏, and his distance from the Earth 98877.

The

The Operation in Mercury.

	Longit. ☿.	Aphel. ☿.	Node Asc. ☿
Time given.	s d ′ ″	s d ′ ″	s d ′ ″
Years 1601	2 02 49 48	8 12 48 15	1 12 30 00
20	0 14 53 00	34 48	30 00
10	6 05 23 44	17 24	15 00
October	1 07 13 17	1 18	1 08
Day. 27	3 20 29 40	8	07
Hou. 22	3 45 04	0	
Min. 18	3 04	0	
Middle Longitude of ☿	1 24 37 37	8 13 41 53	1 13 16 15
Aphelion substract.	8 13 41 53		
Anomalie of Excent.	5 10 55 44		
Æquation subst.	9 45 39		
Place of ☿ from ⊙.	1 14 51 58		
Node Ascend. subst.	1 13 16 15		
Rests.	0 01 35 43		
Reduction substract.	41		
Pla. ☿ from ⊙ in Eclipt.	1 14 51 17		
Place of the Sun subst..	7 14 43 35		
Anomal. of Commut.	6 00 07 42		
Complem. to 12 Signes	5 29 52 18		
Halfe Summe.	2 29 56 09		
Parallax of Orbe subst.	3 32		
True place of ☿ from the Earth.	7 14 40 03		
That is.	♏ 14 40 3		

Place of the Sun, 14^{d} 43′ 35″ ♏.

Distance of the Sun frõ the Earth 98877

Distance ☿ from ⊙ 31171.

The Anomalie of Latitude, which giveth the inclination 11′ 31″ *North*, the Reduction 41″ *Substract*. and the Curtation o.

98877 Distance of Earth from Sun.
31171 Distance of ☿ from ⊙.

Summe	130048	4,114110
Difference	67706	3,830653
Tangent of 89 56′ 09″		12,850849
Tangent of 89 52 37		12,667392
Differ.	3 32	Parallax of the Orbe.

CHAP. VIII.

To Calculate the Latitude of the five Planets, Saturn, Jupiter, Mars, Venus, Mercury.

As in the Calculation of the Longitude of these five Planets, we have a twofold Longitude given, the one being the true place from the Sun, the other the apparent place from the Earth, which some call the true place, so is there a twofold Latitude, the one whereof is called Centricall, the other Terreneall. The Centricall ariseth from the inclination of the Orbite of the Planet from the Ecliptick, but the other from the motion of the Earth, and is the apparent Latitude, as it is beheld from the Globe of the Earth. The Demonstration whereof you may see in the former Book.

And seeing that the Latitude of any of these Planets may be obteined with much facility, by the Canon of Artificiall *Sines* and *Tangents*, I thought it altogether superfluous to calculate any particular Tables to obtein it, sith the labour would have been altogether as great, and therefore I shall here, in few words, but with much dexterity, give you a universall Rule how it is to be supputated.

The Analogie.

As the Sine of the Angle of Elongation, Is to the Sine of the angle of Commutation:
So is the Co-tangent of the Inclination. To the Co-tangent of the Latitude Required.

At the time above given, of *Tychos* observation 1594, *December* the 10 day, at 7 houres *P. M.* the Latitude of ♄ is required, at which time, the angle of Elongation is $174^d\ 17'\ 16''$, and the angle of Commutation $129^d\ 21'\ 30''$, and because they are greater then the Quadrant, I deduct them severally from the Semicircle 180^d, and there remains, for the angle of Elongation $55^d\ 42'\ 44''$, and for the angle of Commutation $50^d\ 38'\ 30''$: then having before, in the *Example* of ♄, found his Inclination to be $1^d\ 12'\ 53''$ *North*, the Latitude of ♄ may (according to the former Analogie) be readily, and also exactly found.

The Operation in Saturn.

Analogie	Sine of the complement of Elongation	55^d	$42'$	$44''$,	9,917095
	Sine of the complement of Commutation	50	38	30	9,888289
	Co-tangent of the Inclination of ♄	1	12	53	11,673582
	Co-tangent of the Latitude of ♄ *North*	1	17	53	11,644776

Therefore, the Latitude of ♄ was $1^d\ 18'$, agreeing to Observation.

In Jupiter.

In the *Example* before set down, the angle of Elongation is $73^d\ 39'$, and the angle of Commutation $83^d\ 38'\ 9''$, the Inclination of his Orbe being $1^d\ 11'\ 3''$ *North*, hence his Latitude from the Earth will be $1^d\ 8^d\ 36''$ *North*.

Analogie	Sine of Elongation	73^d	$39'$	$00''$	9,982072
	Sine of Commutation	83	38	09	9,997315
	Co-tangent of Inclinatiō	1	11	03	11,644648
	Co-tangent of Latitude	1	08	36	11,699891

In Mars.

In the *Example* of ♂, his Inclination is found to be $1^d\ 6'\ 46''$ *North*, the angle of Elongation $73^d\ 37'\ 30''$, and the Anomalie of Commutation $109^d\ 8'\ 11''$, whose complement is, $70^d\ 51'\ 49''$, which given, the Latitude may be acquired, as before.

Analogie	Sine of Elongation	73^d	$37'$	$30''$	9,982016
	Sine of Commutation	70	51	49	9,975313
	Co-tangent of Inclinatiō	1	6	46	11,711660
	Co-tangent of the Lat.	1	7	48	11,704957

At the time of the above mentioned Observation of *Mæstlin* and *Kepler*, the place of ♃ was $15^d\ 7'\ 23''$ ♏, and the place of ♂ $15^d\ 8'\ 53''$ ♏, therefore the difference of Longitude was only $1'\ 30''$, and here the difference of Latitude is but $48''$, therefore the Diameter of ♂ being neere $3'$ he Eclipsed ♃ according as *Mæstlin* and *Kepler* observed.

And here I can but smile at the folly of *Lansberge*, who, to fit his own purpose, would have this ☌ ♃ ♂ to be on the 8 day in the morning, and for no other end (as I conceive) but because he could not make the Observation to agree with his Tables, but in opposition of his error, and his own words *fol.* 171 *De Observat. Astron. thesauro*, I say the true Astronomicall account affirmeth, it was the 9th day in the morning; so also testifieth the two famous Observers thereof, *Kepler in Astron. Opt. pag.* 303, and *Mæstlin Epit. Astron. pag.* 519.

In

In Venus.

By the Synopsis of the calculation of ♀ aforegoing, the Inclination of her Orbite is 2ᵈ 15′ 44″ *North*. the angle of Elongation 33ᵈ 52′ 39″, and the complement of the angle of Commutation to the Circle 84ᵈ 32′ 15″. Then to finde her Latitude from the Earth, I say,

Analogie	As the Sine of the angle of Elongation	33ᵈ 52′ 39″	9,746184
	To the Sine of the angle of Commutation	84 32 15	9,998023
	So the Co-tangent of the Inclination	2 15 44	11,403363
	To the Co-tangent of Latitude	1 16 2	11,655202

At the time of this Eclipticall Conjunction of ♂ and ♀, 1590, *October* 3, at 5 *A.M.* the true place of ♂ by my Tables is 15ᵈ 31′ 40″ ♏, and the place of ♀ 15ᵈ 30′ 37″ ♏, also the Latitude of ♂ is 1ᵈ 16′ 7″ *North*, and the Latitude of ♀ 1ᵈ 16′ 2″ *North*, the difference of Latitude is 5″, and the difference of Longitude 1′ 3″, which equallizeth the Parallax of Longitude, which is about 1′ *ad Ortum*, therefore the apparent Diameter of ♀ being 2′, shee covered ♂ just as *Mæstlin* observed at *Tubing*.

In Mercury.

In the former operation of ☿, the angle of Elongation is 3′ 32″, the angle of Commutation 7′ 42″, and the inclination of his Orbite 11′ 31″ *North*: Hence to finde his Latitude, the Analogie is.

Analogie	Sine of the Angle of Elongation	3′ 32″	7,011834
	Sine of the Angle of Commutation	7 42	7,350200
	Co-tangent of the Inclination	11 31	12,474949
	Co-tangent of the Latitude	5 17	12,813315

In this remarkable ☌ of ☉ and ☿ 1631 *October* 28, at 10ʰ 28′ in the Meridian of *Paris*, the place of the Sun was 14ᵈ 43′ 35″ ♏, and the place of ☿ 14ᵈ 40′ 3″ ♏, with Latitude 5′ 17″ *North*, therefore ☿ was distant from the centre of the Sun towards the *North-West* part 6′ 21″, agreeing exactly to the Observation of *Monsier Gassende*.

CHAP. IX.

To finde the Places of the Fixed Stars *at any time given.*

IN regard the motions of the Fixed Stars are, by Observations in all ages, deprehended to be equall, therefore to finde their places, it is no more but to get the middle motion of *The first Star of Aries* to the time given, to which if there be added the distance of the Star whose Longitude is sought, the Aggregate wil be the place of the Star required.

EXAMPLE, I desire to know the place of *The Lyons Heart*, the 1 of *January* 1651, therefore I first gather the motion of *The first Star of Aries* thus.

	s	d	′	″	
1601	0	27	36	59	
40			33	58	
10			8	29	
1651	0	28	19	26	The place of *The first Star of Aries*

Then in the Catalogue of the Fixed Stars, I finde *The Lions Heart* is distant from *The first of Aries* 3ˢ 26ᵈ 40′ (which I finde by substracting the place of *The first of Aries* from the place of *The Lions Heart*) which being added to the place of *The first of Aries*, giveth the place of *The Lions Heart*, *Jan.* 1 1651. In 24ᵈ 59′ 26″ ♌.

Place

		s	d	′	″
Place of *The first Star of Aries, Janu.* 1 1651		0	28	19	26
Distance of *The Lions Heart*, Adde		3	26	40	00
Place of *The Lions Heart, Janu.* 1 1651		4	24	59	26

The like order may be observed in any other of the Fixed Stars placed in the Catalogue.

CHAP. X.

To finde the refraction of any Starre, and to correct the Altitude observed.

y table of re-fractions is in p 186

WIth the Altitude of the Sun, Moon, or Star given, enter the Table of *Refractions*, and the Refraction there found, take from the Altitude observed, and the true Altitude will emerge, or adding the said refraction to the true Altitude, the apparent will emerge. For the Refraction elevates, and makes the Sun, Moon, and Stars, appear higher above the Horizon then they are. But the contrary hapneth in the Parallax, which alwayes depresseth a Star, and makes it appear lower then it is, and therefore the Parallax ought alwayes to be added to the Altitude observed, that the true Altitude may be had.

CHAP. XI.

To finde the middle time of the Conjunction or Opposition of the Luminaries.

THis Precept being of great use, especially in the calculation of Eclipses of the Sun and Moon, it is therefore requisite (for your better understanding) that we here make ample Demonstration: Wherefore,

To the Meridian of the last day preceding the Moneth given, compute the mean Longitude of the Sun and Moon, and if their places concur and agree exactly, the middle time of the New Moon falleth in the Meridian of the last day; or, if the place of the Moon exceed the place of the Sun exactly six Signes, then the middle time of the Full Moon happeneth at the same instant; but if their places otherwise disagree (as most commonly it happeneth) then substract the place of the Moon, from the place of the Sun, and the residue is the distance of the Moon from the Sun, or from the Opposition of the Sun, by allowing 6 Signes, which reduce into Sexagen's, by allowing two Signes to one Sexag. and then convert the said distance (by the *Sexagenarie* Table of the Longitude of the Moon from the Sun) into Dayes, and Minutes of the Day; which being reduced into time, giveth the middle of the New Moon in the year and moneth proposed.

EXAMPLE, It is required to know the time of the New and Full Moon in *March* 1653, therefore, according to the Precept, the middle time is thus obteined.

	⊙ s	d	′	″	☾ s	d	′	″	
Time given.	s	d	′	″	s	d	′	″	
Years 1601	09	19	58	34	0	07	33	29	
Years 40	00	00	17	57	8	27	07	28	
Years 12	00	00	05	23	5	02	08	14	
March.	01	28	09	11	1	27	04	26	
Middle motion of ⊙.	11	18	31	05	4	04	13	37	Middle motion of the ☾.
Middle motion of ☾ subst.	04	04	13	37					
Rests Distance of ☾ from ⊙.	07	14	17	28					
Semicircle subst.	06	00	00	00					
Distance of ☾ from ☍ ⊙.	01	14	17	28					

Which

Which by the *Sexagenary* Table of the Longitude of the ☾ from the ☉, is thus to be reduced into Daies, and Minutes of the Day.

	d	′	″
			06
		12	05
	7	43	08
Distance of ☾ from ☍ of ☉	44	17	28
3^d	36	34	20
37′	7	31	03
59″		11	59
30‴			6

Or thus, which is all one.

	d	′	″
Dist. ☾ frō ☍ ☉	44	17	28
Dayes 3	36	34	20
Rests	7	43	08
37′	7	31	03
Rests		12	05
59″		11	59
Rests			6
30‴			6

Which is reduced into Time thus.

37′	14^h	48′	″	‴
59″		23	36	
30‴			12	00

Totall, Dayes 3 Hou. 15 11′ 48″ 0‴.

Therefore the middle time of the full ☾ happeneth in *March* 1653, the 3 day, 15 houres, 11 minutes, and 48 seconds.

Now to finde the time of the mean ☌ ☉ ☾ next following, I adde to the Full Moon given the halfe *Syzygia* 14^d 18^h 22′ 2″, and the product will give the time of the middle of the Nevv Moon next following, *viz. March* 18^d 9^h 33′ 50″.

Finally, if you would know the times of the New and Full Moons in the following Moneths, adde to the time of the New or Full Moon given still 14^d 18^h 22′ 2″, and you shall have the equall time of the *Syzygia* next following, and thus may you proceed frow New Moon to Full Moon, and from Full Moon to New Moon at pleasure.

CHAP. XII.

To finde the time of the true Conjunction or Opposition of the Sun *or* Moon.

TO the time of the middle ☌ or ☍ ☉ ☾, calculate their true places, and if their motions shall agree, and be both one, the mean and true ☌ falleth together at that very moment; but if their places differ, as most commonly it happeneth, then take their difference, which divide by the true hourely motion of the ☾ from the ☉, the Quotient will give the intervall or distance betvveen the mean *Syzygia* and the true (vvhich never exceedeth 14^h) and this adde to the time of the mean *Syzygia*, if the place of the ☾ be lesse then the place of the ☉, or deduct the same from the time of the mean *Syzygia*, if the place of the ☾ be greater then the place of the ☉, and you shall have the time of the true *Syzygia* vvell nigh; to vvhich time compute the true motions of the ☉ and ☾, and if their places agree exactly, you have the accurate moment of the true *Syzygia*, but if there be some small difference (as often times happeneth) then divide the same by the true hourely motion of the ☾ from the ☉ at that moment, and the Quotient adde to, or substract from, the time before found (according as the place of the ☾ is lesser or geater then the place of the ☉) and you shall have the time of the true *Syzygia*.

EXAMPLE, By the aforegoing precept, the middle time of the ☍ ☉ ☾ in *March* 1653, is the third day, 15^h 11′ 48″, at which time the true places of the ☉ and ☾ are thus enquired.

Middle

☉	s d ′ ″	☾	s d ′ ″
Middle motion of ☉	11 22 05 57	Middle motion of ☾	05 22 05 57
Apog ☉ substract.	03 06 37 03	Apog. ☾ substract.	06 12 01 14
Anomalie of ☉	08 15 28 54	Anomalie of ☾	11 10 04 43
Æquation of ☉ adde	01 59 37	Æquation of ☾ Excen.ad.	1 37 31
True motion of the ☉	11 24 05 34	Motion of ☾ æquated.	05 23 43 28
Place of the ☾	05 23 43 50	Anomalie of ☾ æquated.	11 11 42 14
Dist. of ☾ from ☍ of ☉	21 44	Reflection & variatiō ad.	22
		Place of ☾ coæquate.	05 23 43 50

With the co-æquate Anomalies of the ☉ and ☾, I enter the Tables of their hourly motions, and I finde, the hourly motion of the ☉ to be 2′ 29″, and the hourly motion of the ☾ 29′ 50″, then deducting the ☉ hourly motion out of the Moons, the Remainder 27′ 21″ is the hourly motion of the ☾ from ☉, by vvhich dividing their Distance 21′ 44″, it giveth in the Quotient 47′ 41″, vvhich added to the time of the middle ☍ ☉ ☾, maketh 3^d 15^h 59′ 29″ at vvhich time the ☉ is in 24^d 7′ 32″ ♓, and the ☾ in 24^d 7′ 36″ ♍, therefore because the place of the ☾ exceeds the place of the ☉ 4″, I substract 8″ (which is found by dividing the 4″ by the hourly motion) from the time given, and the corrected time of the true Opposition will be 3^d 15^h 59′ 21″, at which time, I again examine the places of the ☉ and ☾, as you may see in the following Paradigmata's.

☉	s d ′ ″	☾	s d ′ ″
Middle motion of ☉	11 22 07 54	Middle motion of ☾.	05 22 32 04
Apog. ☉ substract.	03 06 37 03	Apog ☾ substract.	06 12 01 27
Anomalie ☉.	08 15 30 51	Anomalie of ☾	11 10 30 37
Æquation of ☉ adde.	00 01 59 38	Æquation of ☾ adde.	00 01 35 28
Anomalie of ☉ co-æquate.	08 16 30 01	Anom. of ☾ coæquate.	11 11 21 34
True place of the ☉.	♓ 24 07 32	True place of the ☾.	♍ 24 07 32

True motion of ☾	5 24 7 32
Node Ascend. substract.	11 22 29 22
Anomalie of the latitude ☾	6 1 38 10.

By the former Synopsis, I finde the ☉ and ☾ are exactly in opposite places, shewing the true Opposition is exactly atteined, then if we substract 5′ 57″, for the Æquation of Civill Days, it leaveth the apparent time 15^h 53′ 24″.

CHAP. XIII.

To finde the apparent Semidiameters of the Sun, Moon, *and* Shadow *of the Earth, in the* Syzygia's, *or New and Full* Moon.

ENter the Table of the Semidiameters of the ☉ ☾, and shadow, &c. and with the Anomalie of the ☉, take his Semidiameter, his Horizontall Parallax, and his hourly motion; Likewise, with the Æquated Anomalie of the ☾, you may take her Horizontall Parallax, and Semidiameter, then from the Aggregate of Horizontall Parallax of the ☉ and ☾, take the ☉ Semidiameter, and the Residue will be the apparent Semidiameter of the Earths shadow.

As in the former Eclipse, the Anomalie of the ☉ is 8^s 16^d 30′ 1″, and therefore his hourly motion is 2′ 29″, Horizontall Parallax 2′ 21″, and his Semidiameter 16′ 32″.

Again

Again, with the Æquated Anomalie of the ☾ 11ˢ 11ᵈ 21′ 34″, I take her Horizontall Parallax 55′ 51″, and her Semidiameter 15′ 38″.

	′	″
Horizontall Parallax of ☉	2	21
Horizontall Parallax of ☾	55	51
Aggregate	58	12
Semidiameter of ☉ substract	16	32
Rests Semidiameter of the Earths shadow	41	40.

CHAP. XIV.

To finde when the Moon *will be Eclipsed, and when not.*

RULE I.

AT the time of the mean Full Moon, if her middle place shall be distant from either of her Nodes lesse then 15ᵈ 12′ either according, or contrary to the succession of the Signs, that Full Moon will be eclipsed,

EXAMPLE. At the time of the middle of the Full Moon before mentioned, to be in *March* 1653, the 3ᵈ 15ʰ 11′ 48″, the middle place of the ☾ is 5ˢ 22ᵈ 5′ 57″, and the place of the Dragons tail 5ˢ 22ᵈ 29′ 28″, so that between the place of the Moon, and her South Node is but 23′ 31″, whereby I conclude the said Full Moon will be eclipsed.

RULE II.

If at the time of the true Full Moon, her Latitude be lesse then the Summe of the Semidiameter of the Moon, and the Earths shadow, the Moon will suffer Eclipse, but if greater, she cannot be eclipsed at that full.

EXAMPLE. In the said Eclipse, her Latitude at the time of the true Full Moon, is 8′ 33″ South, and the Aggregate of the two Semidiameters is 57′ 18″, therefore, because the Moons latitude is lesse then the said Aggregate, I pronounce that the said Full Moon will be Eclipsed.

And here note, that the difference of the Moons Latitude, and the said Semidiameters 48′ 45″ is called the Parts Deficient.

CHAP. XV.

Of the Reduction of time, from the true ☌ or ☍ ☉☾, to the apparent time thereof.

BEcause the time of the apparent ☌ or ☍ ☉☾, before found, doth sometimes a little differ from the true time, as I have before declared, I shall therefore here set down how to obtein the same.

Having found the Reduction of the Moon, as is taught in the 5 Chapter, divide the same by the true hourly motion of the Moon from the ☉, and the Quotient shews the difference desired.

As in our Example aforegoing, where the Anomalie of her Latitude is 6ˢ 1ᵈ 38′ 10″, which gives the Reduction of her Orbite to the Ecliptique 24″ substract, and this being divided by the hourly motion of the ☾ from ☉, exhibiteth in time 53″ to be added to the apparent time 15ʰ 53′ 24″, so that the exact time of the apparent Opposition of the ☉ and ☾ is *March* 3ᵈ 15ʰ 54′ 17″.

S CHAP.

CHAP. XVI.

To finde the distance of the true Conjunction or Opposition of the Sun *or* Moon *from the greatest Obscuration.*

With the Latitude of the Moon, enter the Table of the distance of the true Conjunction and Opposition from the greatest Obscuration, and you shall have the distance required, which divide by the hourly motion, &c.

Example. The Latitude of the Moon in the former Eclipse is 8′ 33″ South Descending, and therefore the distance of the true Opposition from the greatest Obscuration is 45″, which divided by the hourly motion, giveth 1′ 38″ to be substracted, so that the greatest Obscuration happeneth at 15^{h} 52′ 39″.

CHAP XVII.

To finde how many Digits the Moon *will be eclipsed.*

Having found the true Latitude of the Moon, her Semidiameter, and the Semidiameter of the Earths shadow (as before is taught) you are then to deduct the Moons Latitude out of the Aggregate of the said Semidiameters, and the Remainder shall be the Part deficient, which found, you are to reason thus. As the Semidiameter of the Moon, is in proportion to twelve Digits, so is the Part Deficient, to the Digits eclipsed. As in the Eclipse of the Moon to be 1653 *March* 3^{d} 15^{h} 52′ 39″, the Semidiameter of the Moon is 15′ 38″, and the Part Deficient 48′ 45″, therefore I say,

As 31′ 16″ is to 12 Digits, So is 48′ 45″, to 18^{d} 42′ 36″.

By the Sexagenarie Table, the Work is this.

		′	″	‴	
		48	45		
		12			
	9	36			
		9			[Dig. 18 42′ 36″.]
Aggregate	9	45	0		
Diameter ☾	31	16			
	9	18			
		4	48		
	9	22	48		
Rests		22	12		
Diameter of ☾		31	16		
		21	42		
			11	12	
		21	53	12	
Rests		18	48		

Or by the Canon of Logarithms, thus.

As the Diameter of ☾ 31′ 16″ (or 1876″,)	3,273233
Is to 12 Digits (or 720′;)	2,857332
So is 48′ 45″, (or 1925″,)	3,466126
To 18^{d} 42′ 36″ (or 1122‴) as before.	3,050225

CHAP

CHAP. XVIII.

To finde the Minutes and time of Incidence, and the half continuance of the Moon *in the Earths shadow, called in Latine* Mora dimidia.

IN the 29 Chap. of the former Book, I shewed how to resolve this Proposition Trigonometrically, which way, because it affords much brevity, we shall here follow.

In the Example laid down, the Summe of the Semidiameters of the Moon and shadow, being reduced into Seconds, is 3438″, and the Latitude of the Moon 513.

Operation.

Summe of the Semidiameters of Moon and shadow 3438″.
Latitude of the Moon 513

Aggregate	3951	3,596707.
Difference	2925	2,466126.
	Summe	7,062833
Minutes of Incidence 56′ 40″, or 3400″.	half Summe	3,531416

Which are the minutes of Incidence, and half continuance together.

To finde the minutes of the half continuance.

Difference of the Semidiameter of ☾ and shadow 1562
Latitude of the Moon 513

Summe	2075	3,317018.
Difference	1049	3,020775.
	Aggregate	6,337793.
Minutes of the half continuance 24′ 35″ or 1475″.	Semi-aggr.	3,168896.

Then as before is taught, I divide the minutes of Incidence and half continuance together 56′ 40″, by the true hourly motion of the Moon from the Sun, 27′ 21″, and the Quotient giveth the time of Incidence & half tarrience together, 2h 4′ 19″, then I divide the minutes of the half tarrience, by the hourly motion, and the *Quotus* 53′ 56″ sheweth the time of her half continuance in the shadow.

	ho	′	″
Time of the greatest Obscuration	15	52	39
Half Duration.	2	4	19
Beginning of the Eclipse.	13	48	20
End.	17	56	58
Half tarrience in the shadow.	0	53	56
Beginning of totall darknesse.	14	58	43
End of totall darknesse.	16	46	35

CHAP. XIX.

To finde the Latitude of the Moon*, at the beginning and end of the* Eclipse.

THat the Eclipse of the Moon may fitly be described *in Plano*, its here expedient, I shew how to finde her Latitude both at the beginning and ending of the Eclipse: therefore,

Take the minutes of Incidence and half tarrience together, and adde thereto the middle motion of the Sun agreeing to the time of Incidence and half tarrience, the Summe whereof take from the true motion of the Moons Latitude, at the

the time of the middle of the Eclipse, and you shall have the true motion of her Latitude at the time of the beginning of the Eclipse; but adding the same to the true motion of her Latitude at the time of the middle of the Eclipse, you shall have the true motion thereof, at the end of the Eclipse, by help whereof you may by the 5 Chapter finde her true latitude.

EXAMPLE. In the Eclipse, before mentioned, the middle motion of the Sun agreeing to the time of Incidence and half tarrience together is 5′ 7″, which being added to the minutes of Incidence and half tarrience 56′ 40″, maketh 1ᵈ 1′ 47″, this I substract from the true motion of her Latitude at the middle leaveth the motion of her Latitude at the beginning, 6ˢ 0ᵈ 31′ 23″, but being added, it giveth the motion of her Latitude at the end, 6ˢ 2ᵈ 39′ 57″. Hence her Latitude at the beginning is 3′ 10″ South Desc. and at the end 13′ 56″.

CHAP. XX.

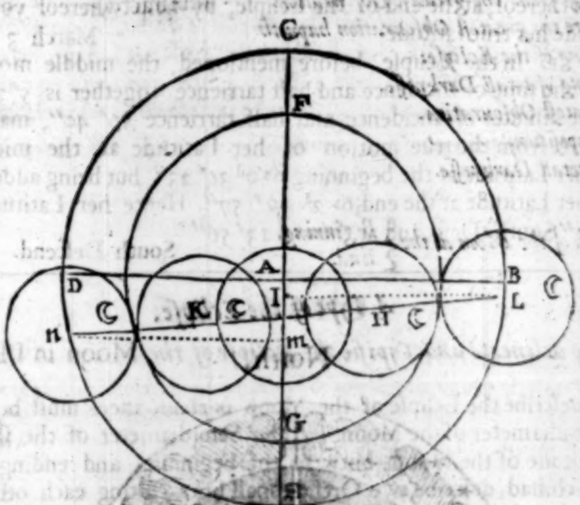
To delineate and Typifie the Eclipse of the Moon in Plano.

TO describe the Eclipse of the Moon *in plano*, there must be given, (1) the Semidiameter of the Moon, (2) the Semidiameter of the shadow, (3) the Latitude of the Moon, both to the beginning and ending of the Eclipse, which had, describe two Orthogonall lines cutting each other in the point A (as you may behold in the following Figure) to be of sufficient length for the number of the Parts of the Aggregate of both the Semidiameters, as D B, E C, and let B represent the West, D the East, C the North, E the South. Then on the Center A, describe a Circle, conteining the Summe of both the Semidiameters, whose Circumference is noted with the lettets B C D E, and on the same Center A, describe a lesser Circle within the former, comprehending onely the Semidiameter of the shadow, whose Circumference is F G. Finally, upon the line C E, note the latitude of the Moon both at the beginning and ending of the Eclipse, numbring it Northward or South-ward from the Ecliptique line B D, according to the denominrtion and species thereof, drawing parallel lines to the East and West, and at the end of each line make a mark, and from these marks draw a streight line, which shall represent the way of the Moon, during the time of the Eclipse, upon which line, describe five Moons (if the Eclipse be totall) the first in C, the second in H, the third in I, the fourth in K, the fift in N, the first towards the West, shewing the beginning of the Eclipse, the second the beginning of total darknesse, the third the middle of the Eclipse, the fourth the end of totall darknesse, the fifth and last the finall end of the Eclipse.

EXAMPLE: In the Eclipse before treated of, the Semidiameter of the ☾ is 15′ 38″, the Semidiameter of the shadow 41′ 40″, the Latitude of the Moon at the beginning 3′ 10″ South, and at the end 13′ 56″, which given, on the Center A, (the Intersection of the two Orthogonall lines) I describe a Circle, conteining the quantity of both the Semidiameters of the Moon and the shadow, 57′ 18″, as B C D B, and on the same Center A, I describe another lesser Circle, as F G F, conteining onely the Semidiameter of the shadow 41′ 40″. Again, in the line E C, from the point A, towards E, I note the Latitude of the Moon at the beginning of the Eclipse 3′ 10″, South, drawing the line I L parallel to A B. Also in the same line I account the Latitude of the Moon in the end of the Eclipse 13′ 56″ South, extending M N parallel to A D, which done, I draw forth a streight line from L to N, which shall represent the way of the Moon during the said Eclipse, and lastly, L sheweth the place of the Moon at the beginning of the Eclipse, H her place when she begins to be totally darkned, I her place at the middle, K her place when she begins to recover light, and N the end of the Eclipse, or the place when she recovers her perfect light.

The

The Figure.



CHAP. XXI.

A Synopsis of the whole Calculation.

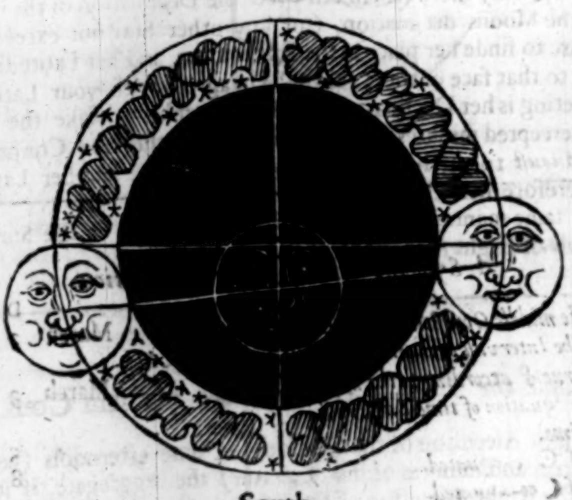
		D	H	′	″
THe middle Opposition of the Luminaries.	March	3	15	11	48
The Intervall between the middle and true ☍ Add.			0	47	33
True ☍ according to the middle time.	March	3	15	59	21
Æquation of time Substract.				5	57
Apparent time.		3	15	53	24
Anomalie of ☉ co-æquated.		8	16	30	1
Anomalie of ☾ co-æquated.		11	11	21	34
True motion of the Moons Latitude.		6	1	38	10
True Latitude of the Moon.	South Desc.			8	33
The true place of the Sun.		♓	24	7	32
The true place of the Moon in her Orbite.		♍	24	7	32
Reduction Substract.					24
Place of the Moon in the Ecliptique.		♍	24	7	8
Hourly motion. { *Sun*				2	29
{ *Moon.*				29	50
{ *Moon from Sun.*				27	21
By which I divide the Reduction or Distance of ☉ and ☾					24
And the Quotient in time is.					53
Therefore the exact time of the apparent ☍ ☉☾ is	March.	3	15	54	17
Semidiameter of *Moon.*				15	38
Semidiameter of *Shadow.*				41	40
Aggregate of the two Semidiameters.				57	18
Parts Deficient.				48	45
Digits Eclipsed.	Dig.		18	42	36
Minutes of Incidence and half tarrience together.				56	40
Minutes of half tarrience.				24	35
Time of Incidence and half tarrience together.			2	4	19
Time of half tarrience.				53	56
Totall Duration.			4	8	38

Latitude

		D	H	′	″
Latit. ☾, *giveth the Distance of the true* ☍ *from the greatest Obscuration.*					45
Which divided by the hourly motion giveth the space of the true ☍ *from the greatest Obscuration.*	Substract			1	38
Therefore the greatest Obscuration hapneth.	March	3	15	52	39
Beginning of the Eclipse.			13	48	20
Beginning of totall Darknesse.			14	58	43
The greatest Obscuration.			15	52	39
True Opposition.			15	54	17
End of totall Darknesse.			16	46	35
End.			17	56	58
Latitude of the Moon at the { *Beginning.*	South Descend.			3	10
{ *End.*				13	56

A Type of the Eclipse.

North.

East.  West.

South.

CHAP. VIII.

To finde the Declination and Right Ascension of any point given, not exceeding five Degrees of Latitude.

Albeit, in the second Book, I have variously shewed how to finde the Declination, Right Ascension, Ascensionall Difference, Oblique Ascension, and point ascending by the Doctrine of Trigonometry, yet considering that way is not altogether so expedite and ready for practise, as some may desire, I shall therefore here shew how to finde the same with more speed, for the more quick Calculating the Suns Eclipse.

To finde the Declination.

Enter the Table entituled [*A Table of Declinations*] finding the Signe and Degree in the first Column descending on the left hand, and the Latitude on the Head, and in the common angle (by making proportion for the intercepted minutes) is the Declination required.

To finde the Right Ascension.

In like manner, enter the Table of Right Ascensions, and you have your desire.

EXAMPLE. At the time of the true Conjunction of Sun and Moon to be 1654. *August* 1ᵈ 22ʰ 0′ 43″. I require the Declination and Right Ascension of the Sun

Sun and Moon: The Sun is then in ♌ $19^d\ 34'\ 25''$, and the Moon in the same place, with North Latitude $29'\ 7''$: Therefore (first) to finde the Suns Declination, I enter the Table, finding ♌ 19^d, against which, in the second Column, is $15^d\ 11'$, the Declination answering thereunto: But because the minutes of the Suns place are not to be found; therefore, to take the proportionall part, I take the difference of Declinations between 19^d and 20^d, which is $18'$; then by the Sexagenary Table, the proportionall part is thus to be extracted:

As 1^d or $60'$, is to $18'$; so is $34'\ 25''$, to $10'\ 19''$.

	18	00
	10	12
	7	30
Part Proportionall	19	30

Which $10'\ 19''$ being substracted from the Declination before found (because the Declination decreaseth) there remaineth $15^d\ 0'$ the Declination of the Sun required.

But to finde the Moons declination, (or any other Star not exceeding 28^d Declination) you are to finde her place in the first column, and her Latitude on the Head (having respect to that face of the Table, which agrees with your Latitude) and in the angle of meeting is her Declination, onely remember to take the proportionall Part, for the intercepted minutes. Thus, at the time of the true Conjunction of the ☉ and ☾ to be *August* 1654, her place is $19^d\ 34'\ 25''$ ♌, and her Latitude $29'\ 7''$ North, and therefore her Declination $15^d\ 27'$.

After the self same manner is found the right Ascension of the Sun, Moon and stars, by the Table of Right Ascensions.

CHAP. XXIII.

To finde the Right Ascension of the Medium Cœli.

TO the Right Ascension of the ☉, adde the time afternoon (being reduced into degrees and minutes of the Æquator) the Aggregate, if it exceed not 360^d, is the Right Ascension of the *Medium Cœli*, but if it be greater, substract 360^d therefrom, and the residue will be the Right Ascension desired. As at the time of the true Conjunction of the ☉ and ☾ before mentioned in *August* 1654, the Right Ascension of the ☉ is $142^d\ 0'\ 28''$, and the time given $22^d\ 0'\ 43''$.

The Operation.

	D	′	″
Right Ascension of the Sun	142	00	28
Houres 22	330	00	00
Minutes 00	0	00	00
Seconds 43		10	45
Aggregate	472	11	13
Circle substracted	360	00	00
Right Ascens. of *Medium Cœli*	112	11	13

Now if you adde 90^d to the Right Ascension of the *Medium Cœli*, the summe will be the Oblique Ascension of the Point rising $202^d\ 11'\ 13''$.

CHAP.

CHAP. XXIV.

To finde the point of the Ecliptique Ascending.

HAving found the Oblique Ascension of the Point Orient by the former Chapter, enter the Table of the Oblique Ascensions of the Ecliptique, and having found the Latitude of your place in the front of the Table, descend the said Row, till you finde the Oblique Ascension given, against which, towards the left hand, you have the Sign and Degree ascending, onely you must remember to take the Proportionall part for the intercepted Degrees, as before we shewed.

EXAMPLE. The Oblique Ascension before given, is 202^d 11′ 13″, and therefore the Point rising in the Latitude of 51^d 32′ is 15 37′ ♎, whose opposite place 15^d 37′ ♈, is the point setting and the intermediate Point, *viz.* 15^d 37′ ♋, is the 90^d (or greatest Altitude) of the Ecliptique at that moment.

CHAP. XXV.

To finde when the Sun *shall be Eclipsed, and when not, at the time of the visible Conjunction of the* Sun *and* Moon.

BEcause the Sun is not Eclipsed in every Conjunction, but when it happeneth neer one of the Nodes, and so hath little or no Latitude, its expedient, I here insert the two Rules used of Astronomers, to find certainly when the Sun wil be eclipsed, and when not, the one whereof hath been in great esteem with Antiquity, notwithstanding the other is more exact, but withall more difficult, both which in their order are here set down.

Rule 1.

If the middle motion of the Moons Latitude at the time of the middle Conjunction of the Sun and Moon, be distant from the North Node lesse then 20^d 40′ or from the South Node lesse then 11^d 22′, the Sun may be eclipsed at that Conjunction.

EXAMPLE. At the time of the middle Conjunction of the Luminaries, which is to happen 1654 *August* 1 22 2′ 44″, the middle motion of the Moons Latitude is 5^s 26^d 20′ 30″, and therefore Distant from the North Node, 3^d 39′ 30″, whereby I gathar the Sun will be eclipsed at that Conjunction.

Rule 2.

If the apparent Latitude of the Moon at the time of the visible Conjunction be lesse then the summe of the Semidiameters of the ☉ and ☾, the ☉ will then suffer Eclipse, but if greater, the ☉ will suffer no Eclipse at that time.

EXAMPLE. In the said Eclipse, the apparent Latitude of the ☾ at the time of the visible Conjunction, will be 5′ 4″, which is lesse then the summe of the two Semidiameters, therefore the ☉ will be Eclipsed.

But this Rule is not of so much use as the former, because it never takes place, till the Calculation be in a manner finished, therefore in the first place make use of the former, and be sure the Moon be within the Ecliptique Bounds, and Limits, lest you spend time and pains to no purpose.

CHAP. XXVI.

To know whether the Eclipse of the Sun happens in the Orientall or Occidentall Quarter of the Ecliptique.

HAving found the Point ascending and descending, and the 90^d of the Ecliptique as before is shewed; mark if the Eclipse happen between the 90^d and the Point ascending, if so, it hapneth in the Orientall Quadrant, but if it happen between the said 90^d and the Point descending, the Conjunction then hapneth in the Occidentall Quarter of the Ecliptique.

EXAMPLE. At the apparent time of the true Conjunction of the Sun and Moon, to be 1654 *August* 1^d 22^h $0'$ $43''$, the Ascendant is 15^d $37'$ ♎, and the 90^d 15^d $37'$ ♋, therefore the Sun being in 19^d $34'$ $25''$ ♌, is placed between the 90^d and the Horoscope, whereby, I conclude, the said Conjunction happeneth in the Orientall Quarter of the Ecliptique.

Again, deducting the place of the 90^d, which is 15^d $37'$ ♋, from the place of the ☉, the Remainder is the Distance of the ☉, from the 90^d, towards the Point Orient. *viz.* 33^d $57'$ $25''$.

CHAP. XXVII.

To finde the Altitude of the Sun *or* Moon.

IN the tenth Chapter of the second Book, is shewed how to finde the Altitude of the Sun or Moon, at any time, by the Doctrine of Sphæricall Triangles, according to which Doctrine, (because its the most absolute of all others) I shall here adde an Operation, for finding the ☉ Altitude, the said first of *August* 1654 at 22^h $0'$ $43''$, it being the apparent time of the true Conjunction of the Luminaries in the Meridian of *London*, where:

The Elevation of the Pole is	51^d $32'$ $0''$	
The Complement.	38 28 0	
Distance of ☉ from the Meridian.	29 49 15	which is found

by subducting the Right Ascension of the *Medium Cœli*, from the Right Ascension of the ☉.

I	The Operation.	II	
Radius 90^d,	10,00000	Co-sine of 34^d $34'$ $41''$,	9,91558
Tangent 38^d $28'$;	9,90009	Co-sine of 38 28 0	9,89375
Co-sine of the angle given 29^d $49'$ $15''$,	9,93831	Co-sine of 40 25 16,	9,88155
Tangent of 34^d $34'$ $41''$:	9,83840	Sine of 46 23 0:	9,85972

Therefore the Altitude of the of the ☉ in the Meridian of *London* will be at the same moment 46^d $23'$ $0''$. After the same manner the Altitude of of the ☾ is to be acquired, as is taught in the second Book, tenth Chapter.

CHAP. XXVIII.

To finde the Parallacticall angle according to the Doctrine of the second Book, twentieth Chapter.

AT the apparent time of the true Conjunction of the Sun and Moon, before notified, we have given: (1) the Altitude of the Sun 46^d $23'$ (and therefore his Distance from the Zenith 43^d $37'$ $0''$) (2) his Distance from the 90^d, towards the Orient 33^d $57'$ $25''$. Hence the Parallacticall will be 45^d $1'$ $46''$, as the following Synopsis makes appear.

Tangent of 43^d $37'$ $0''$,	9,979021
Radius 90^d;	10,000000
Tangent of 33^d $57'$ $25''$,	9,828283
Co-sine of 45 1 46:	9,849262

T CHAP.

CHAP. XXIX

To finde the Parallax of the Moon *from the* Sun *in Altitude, according to the Doctrine of the second Book 22 Chapter.*

AT the apparent time of the true Conjunction, before mentioned, the Distance of the Sun from the Zenith is 43^d 37′ 0″, and the Distance of the Moon from the Zenith 43^d 16′ 22″, also the Distance of the Sun from the Earth is 101302 and the Distance of the Monn 3981, (the Semidiameter of the Earth being 68½) which given, the Operation is as followeth.

In the Sun.			In the Moon.		
	101302.0			39810	
	68.5			68.5	
Summe	101370.5	5,00591	Summe	4049.5	3,60740
Difference	101213.5	5,00532	Difference	3912.5	3,59245
Tangent of	68^d 11′ 30″,	10,39779	Tangent of	68^d 21′ 49″,	10,40158
Tangent of	68 9 54:	10,39720	Tangent of	67 40 45:	10,38663
Difference	1 36		Difference	41 4	

Parallax of the Moon in Altitude.	41′ 4″
Parallax of the Sun in Altitude substract.	1 36
Parallax of the Moon from the Sun in Altitude.	39 28

CHAP. XXX.

To finde the Parallax of the Moon *from the* Sun *in Longitude and Latitude.*

AT the apparent time of the said Conjunction, the Parallacticall angle is 45^d 1′ 46″, and the Parallax of the Moon from the Sun in Altitude 39′ 28″, which known, the Parallax of the Moon from the Sun both in Longitude, and Latitude, according to the second Book 24 Chap. is thus atteined.

I		II	
Radius 90^d,	10,00000	Radius 90^d,	10,00000
Tangent of 39′ 28″;	8,05998	Sine of 45^d 1′ 46″;	9,84971
Co-sine of 45^d 1′ 46″,	9,84926	Sine of 39 28″,	8,05995
Tangent of 27′ 54″:	7,90924	Sine of 27 55:	7,90966
Parallax of Longitude 27′ 54″.		Parallax of Latitude 27′ 55″.	

CHAP. XXXI.

To finde the apparent hourly motion of the Moon *from the* Sun.

Rule 1. IF the Eclipse of the Sun happen in the Orientall Quadrant of the Signifer, and the *Parallaxis Longituinis* decrease, substract the *Parallaxis Longitudinis*, in one hour or half hour, from the true hourly or half hourly motion of the ☾ from ☉, but if the *Parallaxis Longitudinis* encrease, adde the said Difference.

Rule 2. If the Sun all the time given, be in the Occidentall Quadrant, and the *Parallaxis Longitudinis* decrease, adde the Difference of the *Parallaxis Longitudinis* to the hourly, or half hourly motion of the Moon from the Sun, otherwise substract the same from the true hourly or half hourly motion, if the *Parallaxis Longitudinis* increase.

Rule 3. If the true Conjunction happen in the 90^d of the Ecliptique, so that the former part of the Eclipse happeneth in the Orientall, and the latter part in the Occidentall Quadrant, in which case substract the Difference of the *Parallaxis Longitudinis* from the true hourly motion of the ☾ from the ☉, and the Residue will be the hourly motion of the ☾ from the ☉ seen.

EXAMPLE.

EXAMPLE. In the year 1654, *August* 1d 22h 0′ 43″, the true hourly motion of the Moon from the Sun, is 32′ 41″, and the *Parallaxis Longitudinis*, 27′ 54″, and because the Conjunction happeneth in the Orientall Quarter of the Ecliptique, I get the *Parallaxis Longitudinis*, to the hour preceeding, which I finde to be 35′ 9″, the Difference is 7′ 15″, and because the *Parallaxis Longitudinis*, decreaseth, I deduct the said Difference from the true hourly motion 32′ 41″, and the Remainder 25′ 26″, is the hourly motion of the Moon from the Sun seen to the hour preceeding the true Conjunction.

CHAP. XXIX.

To finde the Intervall, or space between the true and apparent Conjunction of the Luminaries.

TO the time of the true Conjunction, compute the *Parallaxis Longitudinis*, of the Moon from the Sun, and if it be lesse then the hourly motion seen, divide the same by the hourly motion seen, and the Quotient will be the Intervall, or space between the true and apparent Conjunction, to be substracted from the time of the true Conjunction in the Orientall Quadrant, and to be added in the Occidentall. But if the *Parallaxis Longitudinis* be greater then the hourly motion of the Moon from the Sun seen, first take the hourly motion seen out of the *Parallaxis Longitudinis*, and the Residue part by the hourly motion of the Moon from the Sun seen, for the hour wherein it fals, and the Quotus will give the space of time above one hour, between the true and apparent Conjunction, either to be added to the time of the true Conjunction, or to be substracted from the same, according as it happens in the Orientall or Occidentall parts of the Ecliptique, as hath been said before.

EXAMPLE. At the time of the true Conjunction of the Sun and Moon to happen 1654 *August* 1d 22h 0′ 43″, (which fals in the Orientall Quadrant, according to the 26 Chapter:) at which time the *Parallaxis Longitudinis* is 27′ 54″, from which I deduct the hourly motion seen 25′ 26″, and there remains 2′ 28″, therefore I again get the *Parallaxis Longitudinis*, to 15′ of an hour sooner, and I finde the Difference of the the *Parallaxis Longitudinis* answering to 15′ to be, 1′ 34″, and therefore the motion of the Moon from the Sun seen agreeing to 15′, is 6′ 36″, by which I divide the Remainder of the *Parallaxis Longitudinis*, 2′ 28″, and the *Quotus* 5′ 29″ is the measure of time above one hour, that the visible Conjunction antecedes the true.

		D	H	′	″
Apparent time of the true Conjunction at *London*,	*August*	1	22	0	43
Intervall of the true and visible Conjunction,	*Substract*		1	5	29
Time of the visible Conjunction at *London*,	*August*	1	20	55	14

If you would know whether this be the exact time of the visible Conjunction, or no, seek the *Parallaxis Longitudinis*, to the time of the visible Conjunction, and also the true distance of the Sun and Moon by the true hourly motion, for if these two shall be equall, you may conclude the visible Conjunction is truly found, but if otherways, the time of the visible Conjunction is to be corrected.

EXAMPLE. At the time of the visible Conjunction to be 1654, *August*, 1d 20h 55′ 14″, I finde the *Parallaxis Longitudinis* to be 35′ 43″, towards the East, and the true Distance of the Moon from the Sun to be also 35′ 43″ towards the West, and because they are equall, I conclude the visible Conjunction is precisely found.

CHAP. XXXIII.

To find the apparent Latitude of the Moon *at the time of the visible Conjunction.*

HAving found the time of the visible Conjunction, and rectified the place of the Moon to the time of the true Conjunction, then by the true hourly motion, compute the true motion of the Moon for the Intervall or space between the true and apparent Conjunction, which adde to, or substract from, the true motion of the Moon at the time of the true Conjunction, according as the visible, precedes or succeeds the true, and you shall thereby obtein her true place at the time of the visible Conjunction. In like manner are you to reduce the place of her Node Ascending to the visible Conjunction, then deduct the motion of her Node Ascending, from the true motion of the Moon, the Remainder will be the Anomalie of the Moons Latitude at the time of the visible Conjunction, by which (according to the 5 Chap.) you may obtein her Latitude, then, as before is taught; you must also to the same instant, calculate the *Parallaxis Latitudinis*, then consider whether they be both of one affection, that is to say, both North, or both South, if they be, adde her Parallax and Latitude together, but if they be of different affections, namely, the one North, and the other South, then substract the lesser from the greater, for so the Aggregate, or Difference, wil shew the apparent Latitude of the Moon at the time of the visible Conjunction, either Northward, or Southward, which you may always know by the propriety of the greater number, for the Latitude of the Moon seen will be of the same Denomination and Species that the greater number is of, &c.

An illustration by Example.

		S	D	′	″
Place of ☾ at time of the true ☌.		4	19	34	25
Motion of ☾ agreeing to the Intervall of the true and visible ☌.	*Substr.*			38	17
True place of ☾ at time of the visible ☌.		4	18	56	8
Place of her Node Ascend. at time of the visible ☌.	*Substract*	10	25	9	12
True motion of ☾ Latitude from ☊ at time of visible Conjunction.		5	23	46	56
Therefore her true Latitude.	*North Desc.*			32	27
Parallaxis Latitudinis of ☾ from ☉.	*South Substract*			26	47
Rests Latitude of ☾ seen.	*North Descend.*			5	40

CHAP. XXXIV.

To finde how many Digits the Sun *will be Eclipsed.*

FRom the Aggregate of the Semidiameters of the Sun and the Moon, deduct the apparent Latitude of the Moon at the time of the visible Conjunction, the Remainder will be the Parts deficient, which being obteined: the Analogie is. As the Diameter of the Sun 32′ 28″, is to 12 Dig. so is the Parts Deficient 27′ 6″, to 10 Dig. 0′ 59″.

The Operation by the Sexagenary Table.

			′	″		
			27	6		
			12			
		5	24			
			1	12		[10 Dig. 0′ 59″.
Aggregate		5	25	12		Therfore the Digits Eclipsed are 10 Dig. 0′ 59″.
Diameter ☉	32	28				
		5	20			
			4	40		
		5	24	40		
Rests			0	32		
Diameter ☉			32	28		

CHAP.

CHAP. XXXV.

To finde the Minutes and time of Incidence, Emersion, and Duration of the Suns Eclipse.

IN the second Book 29 Chap. you have sufficient Directions to finde the minutes of Incidence, neverthelesse it cannot here be amisse (according to the fundamentall grounds there delivered) to annex the Operation applyed to our present purpose.

In the Eclipse of the Sun before treated of, to be 1654, the Summe of the Semidiameters of the ☉ and ☾ being reduced into seconds, is 1966″, and the Latitude of the Moon seen 5′ 40″, or (being reduced) 340″.

The Operation.

Summe of the Semidiameters of ☉ and ☾	1966″		
Latitude of the ☾ seen	340		
Summe	2306	——	3,362859
Difference	1626	——	3,211120
		Aggregate	6,573979
Minutes of Incidence 32′ 16″, or 1936″.		Semi-aggreg.	3,286989

Lastly, to finde the time of Incidence and Emersion, we must get the hourly motion seen, (as is before taught) for the hour preceding the visible Conjunction, and also for the hour succeeding it: by the former whereof, divide the minutes of Incidence and the Quotient will be the time of Incidence, and by making Division by the latter, the Quotient will be the time of Emersion.

As in the Eclipse of the Sun, to be 1654, *August* 2d *A. M.* the hourly motion seen, to the hour preceding the visible Conjunction is 27′ 2″, and to the hour succeeding it 24′ 45″, therefore, to finde the time of Incidence and Emersion, I work as followeth.

Minutes of Incidence	32′ 16″		Minutes of Incidence	32′ 16″
Hourly motion seen 1h before the visible ☌.	27 2 [1h 11′ 37″		Hourly motion 1h following.	24 45 [1h 18′ 13″
Rests	5 14		Rests	7 31
Hourly motion	27 2		Hourly motion	24 45
	4 57			7 12
	0 22			13 30
	4 57 22			7 25 30
Rests	16 38		Rests	5 30
Hourly motion	27 2		Hourly motion	24 45

	H	′	″
Hence the time of Incidence is	1	11	37
The time of Emersion	1	18	13
The totall duration	2	29	50

CHAP. XXXVI.

To finde the Intervall between the visible Conjunction, and the greatest Obscuration.

WIth the Latitude of the Moonseen, enter the Table of the Distance of the true or visible ☌ or ☍ ☉ ☾ from the greatest Obscuration, and the Distance there found, divide by the hourely motion seen, the *Quotus* will give the Intervall of time to be added, or substracted (according to the Titles) to or from the visible Conjunction, so will the Summe, or Difference, shew the time of the greatest Obscuration.

Ex-

EXAMPLE. The Latitude of the Moon seen in our Eclipse 5′ 40″, North-Descending, giveth the Intervall 29″, with the Title *Adde*, which divided (as in manner aforesaid) by the hourly motion seen, for the hour following the visible Conjunction 24′ 45″, pointeth out the Intervall of time between the visible Conjunction and greatest Obscuration 1′ 10″ to be added, whereby the greatest Obscuration is at 8^h 56′ 24″ in the morning, from which substracting the time of Incidence, sheweth the beginning of the Eclipse, and adding thereto the time of emersion, the Aggregate wil shew the time of the ending of the Eclipse.

		D	H	′	″
Time of greatest Obscuration,	*August*	2	8	56	24
Time of Incidence,	*Substract*		1	11	37
Time of the beginning of the Eclipse.			7	44	47
Time of emersion.	*Adde*		1	18	13
Time of the end of the Eclipse			10	14	37

Vide Lib. 2. cap. 3c.

CHAP. XXXVII.

To finde the apparent Latitude of the Moon *at the beginning and ending of the Eclipse.*

ACcording to the Directions before laid down, calculate the true Latitude of the Moon, and the *Parallaxis Latitudinis*, both to the time of the beginning and ending of the Eclipse, which you are to conferre together, making addition, or substraction, as you are directed Chapter 33, and you shall have the *Latitudo apparens*, or Latitude seen, both to the beginning and ending of the Eclipse.

EXAMPLE. At the beginning of the Eclipse, the true Latitude of the Moon is 35′ 58″ North, and the *Parallaxis Latitudinis*, 26′ 49″ South, and because they are of different affections, I take their Difference 9′ 9″, which sheweth that the Latitude of the Moon seen at the beginning of the Eclipse, is 9′ 9″ North. Again, at the end of the Eclipse, the Latitude of the Moon is 28′ 22″ North, and the *Parallaxis Latitudinis* 28′ 12″ South, which deducted from the former, leaveth the Latitude of the Moon seen at the end of the Eclipse 0′ 10″ North.

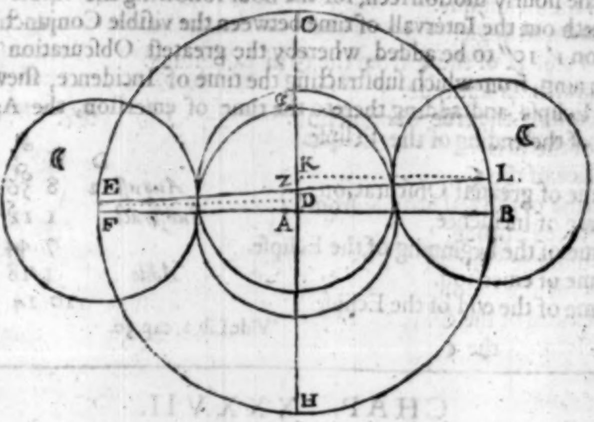
CHAP. XXXVIII.

To describe the Eclipse of the Sun *in plano.*

THe Delineation of the Suns Eclipse differs not much from the Moons, for in the following Figure, on the Point A, (the intersection of the Orthogonall lines) draw a Circle, which may contein the Semidiameters of the Sun and Moon, and then place the apparent Latitude at the beginning and ending of the Eclipse, as you were directed in the Moons Eclipse.

EXAMPLE. In the Eclipse of the Sun to be 1654, *August* 2^d, the Semidiameter of the Sun is 16′ 14″, and the Semidiameter of the Moon 16′ 32″, also the apparent Latitude of the Moon at the beginning is 9′ 9″ North, and at the end 0′ 10″, North, therefore (in the Figure following) on the Center A, I describe a Circle representing the Sun, whose Semidiameter A C shall contein 16′ 14″, then from the Center A, upon the line A C, I number the apparent Latitude in the beginning of the Eclipse 9′ 9″ North, drawing forth the line K L, parallel to A B, and likewise from the Center A, upon the line A C, I number the *Latitudo apparens*, at the end of the Eclipse 0′ 10″ North, drawing the line D E, parallel to A F, then extend a line from L to E, which shall signifie the way of the Moon during the time of the Eclipse, upon which line describe three Moons, whereof the first upon the Center L, shews her place at the beginning of the Eclipse, the second upon the Center Z, shews her place at the middle of the Eclipse, and the third upon the Center E, shews her place at the end of the Eclipse, as may appear by the following Scheme.

A Figure thereof.



CHAP XXXIX.

A Synopsis of the Calculation.

		S	D	′	″
		D	Ho.	′	″
The middle Conjunction of the Luminaries.	*August*	2	10	2	44
The Intervall of the middle and true Conjunction.	*Subs.*		11	52	37
The middle time of the true Conjunction.	*August*	1	22	10	7
Æquation of Time.				6	55
The apparent time of the true Conjunction.	*August*	1	22	3	12
The Co-æquate Anomalie of the ☉.		1	13	36	52
The Co-æquate Anomalie of the ☾.					
The true place of ☉ (and ☾ in her Orbite.)		♌	19	34	25
Motion of the Moons Node Ascending.		10	25	9	3
Hence the Anomalie of her Latitude from ☊.		5	24	25	22
Therefore her true Latitude.	*North Descending*			29	7
Reduction adde.				1	21
Place of ☾ in the Ecliptique.		♌	19	35	46
☉				2	24
Hourly motion of the ☾.				35	5
☾ from ☉.				32	41
By which dividing the Reduction, the Quotient in time is	*Subst.*			2	29
Exact time of the true Conjunction at *London.*	*August*	1	22	0	43
At which time the ☉ is distant from the Meridian.			29	49	15
And the ☾.			29	58	26
Declination of the ☉.			15	0	3
Declination of the ☾.			15	27	43
Right Ascension of the ☉.			142	0	28
Right Ascension of the ☾.			142	9	39
Altitude of the ☉.			46	23	0
Altitude of the ☾.			46	43	38
Distance of the ☉ from the Earth.			101302		
Distance of the ☾ from the Earth.			3981		
Parallax of the ☉ in the Circle of Altitude.				1	36
Parallax of the ☾ in the Circle of Altitude.				41	4
Parallax of the ☾ from the ☉ in the Circle of Altitude.				39	28
Right Ascension of the *Medium Cœli.*			112	11	13
Adding 90^{d}. giveth the Oblique Ascension of the point rising.			202	11	13

Therefore

		D S	H D	' '	'' ''
Therefore the point rising is.			15	37	♎
The 90^{d} of the Ecliptique.			15	37	♋
The Parallacticall angle.			45	1	46
Hence the Parallax of the ☾ from the ☉ in Longitude.				27	54
And the Parallax in Latitude.				27	55
To one preceding the true Conjunction.	*viz.*		21	0	43
The place of the ☉ is		♌	19	32	1
And the place of the ☾.		♌	18	59	20
The Anomalie of the ☾ Latitude from ☊.		5	23	50	9
Hence her true Latitude.				32	10
Declination of the Sun.			15	0	49
Declination of the Moon.			15	41	42
Right Ascension of the ☉.			141	58	5
Right Ascension of the ☾.			141	36	31
Altitude of the ☉.			38	58	39
Altitude of the ☾.			39	44	5
Distance of the ☉ from the Earth.			101302		
Distance of the ☾ from the Earth.			3979		
Parallax of the ☉ in Altitude.				1	49
Parallax of the ☾ in Altitude.				46	1
Parallax of the ☾ from the ☉ in Altitude.				44	12
Right Ascension of the *Medium Cœli*.			97	8	50
Oblique Ascension of the point rising.			187	8	50
Hence the point rising is			2	5	♎
The 90^{d} of the Ecliptique.			2	5	♋
The Parallacticall angle.			37	20	58
Parallax of ☾ from ☉ in Longitude.				35	9
Parallax of ☾ from ☉ in Latitude.				26	49
Difference of the *Parallaxis Longitudinis* in the hour given.				7	15
Hourly motion of ☾ from ☉ seen.				25	26
Which substracted from the *Parallaxis Longitudinis* at the time of the true Conjunction, leaveth.				2	28
To one hour 15' preceding the true Conjunction, *viz.*	*Aug.*	1	20	45	43
The place of the ☉ is.		♌	19	31	25
The place of the ☾.		♌	18	50	34
Anomalie of the Moons Latitude from ☊.		5	23	41	21
True Latitude of the ☾.	*North*			32	56
Declination of the ☉.			15	0	59
Declination of the ☾.			15	45	8
Right Ascension of the ☉.			141	57	32
Right Ascension of the ☾.			141	28	9
Altitude of the ☉.			36	54	6
Altitude of the ☾.			37	46	27
Distance of the ☉ from the Earth.			101302		
Distance of the ☾ from the Earth.			3979		
Parallax of the ☉ in Altitude.				1	52
Parallax of the ☾ in Altitnde.				47	15
Parallax of the ☾ from the ☉.				45	23
Right Ascension of the *Medium Cœli*.			93	23	17
Oblique Ascension of the Horoscope.			183	23	17
Therefore the Horoscopie, or point rising is.		♎	2	23	35
The 90^{d}.		♋	2	23	35
The Parallacticall angle.			36	0	43
Parallax of the ☾ from the ☉ in Longitude.				36	43
Parallax of the ☾ from the ☉ in Latitude.				26	41
True motion of the ☾ from the ☉ agreeing to 15'.				8	10

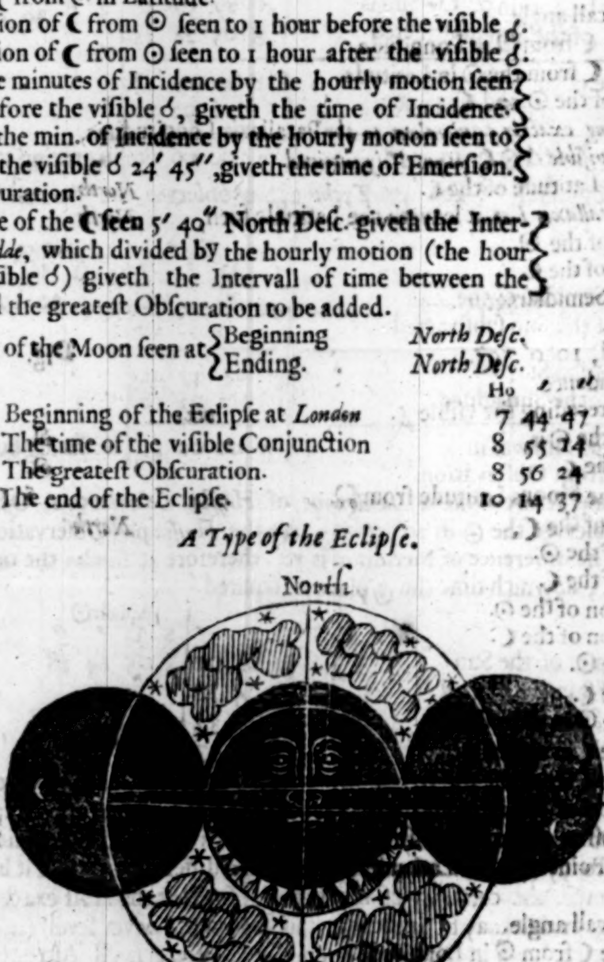
Difference

		S	D	′	″
Difference of the *Parallaxis Longitudinis* agreeing to 15′,	*Substract*			1	34
Motion of the ☾ from ☉ seen, agreeing to 15′.				6	36
By which dividing the Parallax before remaining, it giveth in time				5	29
Therefore the Intervall of the true and visible ☌.	*Substract.*		1	5	29
Hence the visible Conjunction happeneth.	*August*	1	20	55	14
At which time the ☉ is in.		♌	19	31	48
And the ☾.		♌	18	56	8
Anomalie of the ☾ Latitude from ☊.		5	23	46	56
The true Latitude of the ☾.	*North*			32	27
Declination of the Sun.			15	0	53
Declination of the Moon.			15	43	0
Right Ascension of the Sun.			141	57	53
Right Ascension of the Moon.			141	33	10
Altitude of the Sun.			38	13	36
Altitude of the Moon.			39	1	44
Parallax of the ☉ in altitude.				1	50
Parallax of the ☾ in altitude.				46	29
Parallax of the ☾ from the ☉ in altitude.				44	39
Right Ascension of the *Medium Cœli.*			95	46	23
Oblique Ascension of the Point rising.			185	46	23
The point rising.			4	5	♎
The 90 degree.			4	5	♋
The Parallacticall angle.			36	51	56
Parallax of the ☾ from ☉ in Longitude.				35	43
Parallax of the ☾ from the ☉ in Latitude.				26	47
True distance of the ☉ and ☾.				35	43
Which being exactly aquivalent to the Parallaxis Longitudinis, *sheweth the visible* ☌ ☉☾ *is precisely obteined.*					
From the true Latitude of the ☾.	*North*			32	27
Taking the *Parallaxis Lat.* it leaveth the Latitude seen,	*North*			5	40
Semidiameter of the ☉.				16	14
Semidiameter of the ☾.				16	32
Summe of the Semidiameters.				32	46
Part Deficient.				27	6
Digits Eclipsed, 10ᵈ 0′ 59″.	Dig.		10	0	59
Minutes of Incidence.				32	16
To one hour preceding the visible ☌.	viz.		19	55	14
The place of the ☉ is,		♌	19	29	4
The place of the ☾.		♌	18	21	0
Anomalie of the Moons Latitude from ☊.		5	23	11	40
True Latitude of the ☾,	*North*			35	30
Declination of the ☉.			15	1	44
Declination of the ☾.			15	56	15
Right Ascension of the ☉.			141	55	30
Right Ascension of the ☾.			140	59	0
Altitude of the ☉.			29	30	27
Altitude of the ☾.			30	47	4
Parallax of the ☉ in altitude.				2	1
Parallax of the ☾ in altitude.				51	19
Parallax of the ☾ from the ☉.				49	18
Right Ascension of the *Medium Cœli.*			80	44	0
Oblique Ascension of the point rising.			170	44	0
Therefore the Point rising in Latitude 51ᵈ 32′ is.			23	28	♍
The 90ᵈ.			23	28	♊
The Parallacticall angle.			32	54	10
Parallax of the ☾ from ☉ in Longitude.				41	24

	S	D	'	''
Parallax of the ☾ from ☉ in Latitude.			26	47
To one hour after the visible ☌, *viz.*		21	55	14
The place of the ☉ is	♌	19	34	12
And the place of the ☾.	♌	19	31	13
Anomalie of the Moons Latitude from ☊.	5	24	20	10
The true Latitude of the ☾.			29	24
Declination of the ☉.		15	0	7
Declination of the ☾.		15	29	0
Right Ascension of the ☉.		142	0	15
Right Ascension of the ☾.		142	7	0
Altitude of the ☉.		45	46	54
Altitude of the ☾.		46	9	25
Parallax of the ☉ in Altitude.			1	37
Parallax of the ☾ in Altitude.			41	30
Parallax of the ☾ from the ☉.			39	53
Right Ascension of the *Medium Cœli.*		110	48	45
Oblique Ascension of the point rising.		200	48	45
Therefore the point rising in Latitude $51^d\ 32'$ is.		14	39	♎
The 90^d of the Ecliptique.		14	39	♋
The Parallacticall angle.		44	9	15
Parallax of ☾ from ☉ in Longitude.			28	37
Parallax of ☾ from ☉ in Latitude.			27	47
Hourly motion of ☾ from ☉ seen to 1 hour before the visible ☌.			27	2
Hourly motion of ☾ from ☉ seen to 1 hour after the visible ☌.			24	45
Dividing the minutes of Incidence by the hourly motion seen to 1 hour before the visible ☌, giveth the time of Incidence.		1	11	37
So dividing the min. of Incidence by the hourly motion seen to 1 hour after the visible ☌ 24' 45'', giveth the time of Emersion.		1	18	13
The totall Duration.		2	29	50
The Latitude of the ☾ seen 5' 40'' North Desc. giveth the Intervall 29'', *Adde*, which divided by the hourly motion (the hour after the visible ☌) giveth the Intervall of time between the visible ☌ and the greatest Obscuration to be added.			1	10
Latitude of the Moon seen at Beginning	*North Desc.*		9	9
Latitude of the Moon seen at Ending.	*North Desc.*		0	10

	Ho	'	''
Beginning of the Eclipse at *London*	7	44	47
The time of the visible Conjunction	8	55	14
The greatest Obscuration.	8	56	24
The end of the Eclipse.	10	14	37

A Type of the Eclipse.



AN APPENDIX:

Conteining such Observations of the Planets Places, as have been made by the Author and others.

§ 1. *Observations of the Suns Place.*

ANno 1586, Noble *Tycho* observed the Vernall Æquinoctiall the 10 day of March, at 9 houres 2 min. P. M.

For the difference of Meridians of *London* and *Uraniburg*, must be substracted 50 min. hence the time in the Meridian of *London* is March the 10 day, 8 hou. 12 min.

	☉ S	D	′	″	Aphel. ☉ S	D	′	″
The middle motion of the Sun is	11	27	57	50	3	5	28	15
Aphelion of the Sun substracted	3	05	28	15				
Anomalie of the Sun	8	22	29	35				
Æquation of the Sun added		2	02	10				
Therefore the Sun was in	♈	00	00	00	Agreeing to Observatiõ.			

Anno 1588, March 9[d] 20[h] 45′ *Tycho* again observes the Vernall Æquinox at *Uraniburge.*

	☉ S	D	′	″	Aphel. ☉ S	D	′	″
The middle motion of the Sun.	11	27	58	01	3	5	30	19
Aphelion of the Sun substracted	3	05	30	19				
Anomalie of the Sun	8	22	27	42				
Æquation of the Sun added		2	02	10				
Therefore the Sun was in	♈	00	00	11	Differing but ⅙ of a minute from Observation.			

The Illustrious Prince *William Landgrave* of *Hassia*, *Anno* 1572, October the 3[d] at Noon, he observed the ☉ in 20[d] 0′ ♎: See the *Hassiaque* Observation published by *Snellius*: The difference of Meridians is 38′. therefore at *London* the time is, October 2[d] 23[h] 22′, at which time the ☉ place is required.

	☉ S	D	′	″	Aphel. ☉ S	D	′	″
Middle motion of the Sun	6	22	01	05	3	05	14	28
Aphelion of Sun substracted	3	05	14	28				
Anomalie of the Sun	3	16	46	37				
Æquation of the Sun subst.		1	58	27				
The Suns true place	6	20	02	38				

Here the difference between the Calculation and Observation is 2′ 38″, which is not a difference perceptable, but I question the Observation, because other Observations seeme to contradict it, besides, I dare be bold to say (with *Eichstade*) that so small a difference, should it be *hallucinous*, could not blemish the certainty of my Tables, for that the most exact and accurate Tables in being, or that may be expected, can seldome or never levell (in the places of the ☉ ☾ and Stars) neerer then the 15 part of a Degree, as all Astronomers testifie with joynt consent; which I may also affirm of many Observations, wherein errour

may

may arise, either by fallacy of the Instrument, or want of care, and albeit the Instrument be exact, and never so much Circumspection used, yet a difference will many times be, considering the parvity, and insensible magnitude the Instrument bears to the vast distance of the Object.

§ 2. *An Observation of the Moon and the Star called* Aldebaran, *or* the Buls eye.

ANno 1644, *December* 29ᵈ at 9ʰ 15′ *P. M.* I observed that the higher part of the Moon did cover, and eclipse the *Buls eye* from my sight, and this Observation was made at *N. Luffenham*, where the Elevation is 52ᵈ ⅔, and the distance of the Meridian from *London* 3′ *ad Occasum*.

The true place of the Sun from the Earth was then 19ᵈ 9′ 30″ ♑, and the middle motions of the Moon as followeth.

☾ s	d	′	″	Aphel. s	d	′	″	Node Asc. ☽ s	d	′	″
2	04	08	52	7	09	19	06	5	00	40	44

s	d	′	″	
2	04	08	52	
7	09	19	06	Aphelion of the Moon substracted.
6	24	49	46	Anomalie of the Moon.
	02	02	08	Æquation adde.
6	27	00	54	Anomalie of the Moon æquated.
2	06	20	00	Place of the Moon æquated.
9	19	09	30	True place of the Sun.
4	17	10	30	Distance of the Moon from the Sun.
		27	42	Proportionall minutes.
	01	17	10	The Variation and Reflection substract.
2	05	02	50	Therefore the Moons true place in her Orbite.
5	00	40	44	Node Ascending ☾ substract.
9	04	22	06	True motion of the Moons Latitude.
		01	03	Reduction Adde.
♊	05	03	53	True place of the Moon in the Ecliptique.
	04	59	07	Simple Latitude of the Moon.
		16	57	Excesse.
		08	50	The Proportionall part Adde.
	05	07	57	Therefore the true Latitude of the ☾ South.

According to the Doctrine of the second Book 24 *Chap*. the Parallax of the Moon in Longitude was 9′ 10″, in Latitude 35′ 35″, and because the Moon was in the Occidentall Quadrant of the Signifer, her Parallax of Longitude must be deducted from her true place, therefore the Visible place of the Moons Center was 4ᵈ 54′ 43″ ♊, and her Apparent Latitude 5ᵈ 43′ 32″ towards the South. At the same time the true place of *Aldebaran*, was 4ᵈ 58′ 49″ ♊, and the Latitude 5ᵈ 31′ South, hence the Difference of Longitude is 5′ 54″, and the Difference of Latitude 12′ 32″: so that the Star *Aldebaran*, was distant from the Center of the Moon towards the North-West 13′ 58″, but the Semidiameter of the Moon was 16′ 54″, and therefore covered *Aldebaran*, exactly as I observed at *North-Luffenham*.

§ 3. *Observations of* Saturn.

ANno 1583, *September* 3ᵈ at 1ʰ *P. M.* in the Meridian of *Uraniburge*, noble *Tycho* observed ♄ exactly in Oppposition of the Sun, in 19ᵈ 50′ ♓.

For the Difference of Meridians is to be substracted 50′, therefore the time in the Horizon of *London*, was 3ᵈ 0ʰ 10′, at which time we shall first enquire the place of the Sun.

The

	s d ′ ″	Aphel. ☉.
The middle motion of the Sun.	5 21 49 29	s d ′ ″
Aphelion of Sun substracted.	3 05 25 41	3 05 25 41
Anomalie of the Sun.	2 16 23 48	
Æquation of the Sun substract.	01 58 38	
Therefore the Suns place was.	5 19 50 51	
And the Distance of ☉ from the Earth	100452 parts	

	s d ′ ″	
Middle motion of ♄.	11 26 25 13	Place of Sun 19d 50′ 51″ ♍.
Aphelion of ♄ substract.	08 25 36 49	Distance of ☉ from Earth 100452.
Anomalie of ♄ Excent.	03 00 48 24	
Æquation substract.	00 06 34 49	
Place of ♄ from ☉ in his Orbe	11 19 50 24	
Node Ascend. substract.	03 20 22 03	Argument of Latitude, therefore the
Rests.	07 29 28 21	Inclination is 2d 9′ 37″, the Reduction
Reduction substract.	00 00 01 28	1′ 28″, and the Curtation 677 parts.
Place of ♄ from ☉ in Eclipt.	11 19 48 56	955656 ♄ from ☉ *in Orbitâ*
Place of ☉.	05 19 50 51	677 Curt. Sub.
Anomalie of Commutation.	06 00 01 55	954979 Distance Curtated.
Complement to the Circle.	05 29 58 05	100452 Dist. of Earth from ☉
Half summe.	00 89 59 02	Summe 10554 | 31 4,023430
		Differ. 8545 | 27 3,931725
Parallax of the Orbe substract.	00 00 00 13	Tangent of 89d 59′ 2″, 13,552110
True motion of ♄ from the Earth.	11 19 48 43	17,483835
That is in	♌ 19 48 43	Tangent of 89 58 49 13,460405
		0 0 13. Par. of the orb

Anno 1639, *November* 4d at 8h 0′ *P. M. Bullialdus* observed ♄ in 12d 38′ ♒: for the difference of Meridians is to be added 10′, so that the time of Observation in respect of the Meridian of *London*, was 8h 10′, at which time.

	s d ′ ″
The middle Motion of the ☉ is	7 23 40 57
Aphelion of the ☉ substract.	3 06 23 12
Anomalie of the Sun.	4 17 17 45
Æquation substract.	01 24 48
Therefore the true place of Sun.	7 22 16 09
And his Distance from the Earth.	98711

	s d ′ ″	
Middle motion of ♄.	10 23 39 07	
Aphelion of ♄ substract.	08 26 51 58	
Anomalie of ♄.	01 26 47 09	Distance of ♄ from ☉ in his Or-
Æquation substract.	00 05 17 47	bite 985466.
Place of ♄ from ☉ in his Orbite.	10 18 21 20	
Node Ascend. substract.	03 20 55 55	Argument of Latitude, which
Rests.	06 27 25 25	gives the Inclination 1d 9′ 17″, the
Reduction substract.	00 00 01 22	Reduction 1′ 22″, and the Curta-
		tion 196.
Place of ♄ from ☉ in the Eclipt.	10 18 19 58	985270 Distance of ♄ Curtated.
Place of ☉ from the Earth.	07 22 16 09	98711 Distance of Earth from ☉.
Anomalie of Commutation.	09 03 56 11	Summe 10839 | 81 4,035023
Complement to the Circle.	02 26 03 49	Differ. 8865 | 59 3,947706
Half summe.	00 43 01 54	Tangent of 43d 1′ 54″ 9,970137
		13,917843
Parallax of the Orbe substract.	00 05 40 09	
True motion of ♄ fro the Earth.	10 12 39 49	Tangent of 37 21 45 [illegible]

§ 4. *Observations of* Jupiter.

ANno 1591, Aprill the 23^{d} 19^{h} 0′ in the Meridian of *Uraniburge*, *Tycho Brahe* observed ♃ then in opposition of the ☉ in 13^{d} 10′ ♏.

Deducting 50′ for the difference of Meridians, giveth the time at *London* 23^{d} 18^{h} 10′, at which time we are to compute the places of ☉ and ♃ as in the following Synopsis.

In ☉	S	D	′	″
Middle motion of the Sun	1	11	31	58
Aphelion of the Sun substracted	3	05	33	29
Anomalie of ☉	10	05	58	29
Æquation added		1	37	56
True place of the ☉	1	13	09	54
And his Distance from the Earth	101076			

In Jupiter.

	S	D	′	″
Middle motion of ♃	7	16	30	14
Aphelion of ♃ substracted	6	07	44	35
Anomalie of the Excent. of ♃	1	08	45	39
Æquation substract.		3	18	50
Place of ♃ from ☉ in his Orb.	7	13	11	24
Node Ascend. substract.	3	05	23	53
Argument of Latitude	4	07	47	31
Reduction Adde.				28
Place of ♃ from ☉ in Eclipt.	7	13	11	52
Place of ☉	1	13	09	54
Anomalie of Commutation.	5	29	58	02
Halfe Summe		89	59	01
Parallax of the Orbe adde.				27
True motion of ♃ from Earth	7	13	12	19
Therefore ♃ is in	♏	13	12	19

Distance therefore of ♃ from ☉ in his Orbe 542446.

Therefore the inclination of ♃ is 1^{d} 4′ 40″, the Reduction 28″, and the curtation 92 parts.

542354 Dist. ♃ from ☉ Curtated
101076 Distance of Earth fro ☉

Summe 643430 — 3,808503
Differ. 441278 — 3,644711
Tangent of 89^{d} 59′ 1″ — 13,544191
17,188902
Tangent of 89^{d} 58′ 34″ — 13,380399
27 Parall. of Orbe

Anno 1595, September the 12^{d} 6^{h} 10′, (or 5^{h} 20′ in the Meridian of *London*) *Tycho* observed ♃ in 28^{d} 56′ ♓, in Opposition of the ☉.

	S	D	′	″
Middle motion of the Sun	6	00	59	50
Aphelion of the Sun substracted	3	05	38	02
Anomalie of the Sun	2	25	21	48
Æquation substracted		2	02	11
True place of the Sun	5	28	57	39
His distance from the Earth.	100171			

Middle

	S D ′ ″
Middle motion of ♃.	11 29 42 58
Aphelion of ♃ substract.	6 07 49 03
Anomalie of ♃.	5 21 53 55
Æquation substract.	49 12
Place of ♃ from ☉ in his Orbite.	11 28 53 46
Node Ascend. substract.	3 05 24 51
Argument of Latitude.	8 23 28 55
Reduction substract.	08
Place of ♃ from ☉ in the Eclipt.	11 28 53 38
Place of the ☉.	5 28 57 39
Anomalie of Commutation.	6 00 04 01
Complement.	5 29 55 59
Half summe.	89 58 00
Parallax of the Orbe substract.	1 00
True mot. of ♃ from the Earth.	11 28 52 38
That is in	♓ 28 52 38

♃ from ☉ in his Orbite 497366.

The Inclination is 1d 21′ 17″, the Reduction 8″, and the Curtatiō 146.

497366	♃ from ☉ in his Orbite.
146	Curtation substract.
497220	Distance curtated.
100171	Distance of Earth frō ☉.

Summe	597391	3,776256
Difference	397049	3,598844
Tangent of 89d 58′ 0″,		13,235244
		16,834088
Tangent of 89 57 0		13,057832
	1 0	Paral. of Orbe.

§ 5 *Observations of* Mars.

ANno 1591, *June* 8d 7h 43′ the star of ♂ was observed in Opposition of the ☉ in 26d 43′ ♐.

For the Difference of the Meridians of *London* and *Uraniburge*, we are to abate 50′, & therefore the time of this Observation, was (in the Merid. of *London*) at 6h 53′.

The Operation.

	S	D	′	″
Middle motion of the ☉.	2	26	24	33
Aphelion of ☉ substract.	3	5	33	37
Anomalie of the ☉.	11	20	50	56
Æquation of ☉ adde.			19	11
Distance of ☉ from the Earth		101780		
True place of the ☉.	2	26	43	44

	S D ′ ″
Middle motion of ♂.	9 05 48 03
Aphelion of ♂ substract.	4 28 48 24
Anomalie of the Excentr.	4 06 59 39
Æquation substract.	09 03 35
Place of ♂ from ☉ in his Orbite.	8 26 44 28
Node Ascend. substract.	1 16 36 31
Argument of Latitude.	7 10 07 57
Reduction substract.	00 52
Place of ♂ from ☉ in the Eclipt	8 26 43 36
Place of the Sun.	2 26 43 44
Anomalie of Commutation.	6 00 00 08
Complement.	5 29 59 52
Half summe.	89 59 56
Parallax of the Orbe substract.	30
True mot. of ♂ from the Earth.	8 26 43 06
That is	♐ 26 43

Distance of ♂ from ☉ in his Orbe 144674.

The Reduction of ♂ 52″, the Curtation 33.

Agreeing to Observation.

Anno

Anno 1644, *November* 27^{d} at 7 in the morning, I observed ♂ almost ful North, from a star of the third magnitude, call'd *The Heel of the higher Foot of* ♊, he was observed by Instrument to be $3^{d}\,\frac{6}{10}$ from the star towards the North, and about three times his Diameter from the Pole-line towards the West, and because the Right Ascensions of ♂, and the star do both agree with the Zodiacall Arch, I concluded, that ♂ wanted just so much of the said star, in respect of Longitude. The Diameter of ♂ was about $3'$.

The Operation.

	S D ′ ″
Middle motion of ☉.	8 16 35 16
Aphelion of ☉ substract.	3 6 28 33
Anomalie of the ☉.	5 10 6 43
Æquation of ☉ substract.	42 39
Distance of ☉ from the Earth.	98336
True place of the Sun.	8 15 52 37

	S D ′ ″
Middle motion of ♂.	2 11 09 22
Aphelion of ♂ substract.	4 29 53 19
Anomalie of ♂.	9 11 16 03
Æquation of ♂, Adde.	10 05 58
Place of ♂ from ☉ in his Orbite.	2 21 15 20
Node Ascend. substract.	1 17 15 22
Argument of Latitude.	1 03 59 58
Reduction substract.	49
Place of ♂ from ☉ in the Eclipt.	2 21 14 31
True place of the Sun.	8 15 52 37
Anomalie of Commutation.	5 24 38 06
The half summe.	87 19 03
Parallax of the Orbe, Adde.	8 57 24
True mot. of ♂ from the Earth.	3 00 11 55
That is.	♋ 00 12

Distance of ♂ from ☉ in his Orbe 156267

Hence the Inclination of ♂ is $1^{d}\,2'\,4''$ the Reduction $49''$, and the Curtatio 25 parts.

156267 ♂ from ☉ in his Orbite.
25 Curtation substract.

156242 Distance of ♂ from ☉ Cur.
98336 Distance of Earth from ☉.

Summe 254578,	3,405820
Differ. 57906;	2,762723
Tangent of $87^{d}\,19'\,3''$,	11,329265
	14,091988
Tangent of 78 21 39	10,686168

Aggr. 165 40 42, Ang. of Elo.
Diff. 8 57 24, Paral. of Orb.

Sine of the angle of Elongation $165^{d}\,40'\,42''$,	9,393339
Sine of the angle of Commutation $5^{d}\,21'\,54''$;	8,970810
Co-tangent of the Inclination $1^{d}\,2'\,4''$,	11,743367
	20,714177
Co-tangent of the Latitude of ♂ $2^{d}\,44'\,6''$:	11,320838

The true place of the star was $0^{d}\,21'$ ♋, with Latitude $53'$ South, the place of ♂, by the former Synopsis being then 0 12 ♋, with Latitude $2^{d}\,44'\,6''$ North, therefore the Distance of ♂ from the star in respect of Longitude was $9'$ (which is about three times the Diameter of ♂) and in Latitude $3^{d}\,37'$ towards the North, according as I made Observation at *North-Luffenham*.

S 6 An

ANno 1644, *July* 28', at 2h *A. M.* I observed ♃ and ♂ very neer together in the East, ♃ being elevated above ♂, in respect of Latitude 8', and was distant from ♂ about 4' *ad Ortum*. How my Tables agree hereto, I shall here examine.

⊙	S D ′ ″
Middle motion of ⊙.	4 16 8 0
Aphelion of ⊙ substract.	3 6 28 12
Anomalie of the ⊙.	1 9 39 48
Æquation of ⊙ substract.	1 16 58
Distance of ⊙ from the Earth.	101398
True place of the Sun.	4 14 51 2

♃	S D ′ ″
Middle motion of ♃.	1 13 41 28
Aphelion of ♃ substract.	6 08 37 59
Anomalie of the Excent.	7 05 03 29
Æquation Adde.	03 19 30
Place of ♃ from ⊙ in his Orbite.	1 17 00 58
Node Ascend. substract.	3 05 35 26
Rests.	10 11 25 32
Reduction adde.	29
Place of ♃ from ⊙ in the Eclipt.	1 17 01 27
Place of ⊙ from the Earth.	4 14 51 02
Anomalie of Commutation.	2 27 49 35
The half summe.	43 54 47
Parallax of the Orbe, Adde.	11 19 38
True mot. of ♃ from the Earth.	1 28 21 05
That is.	♉ 28 21 05

Gives the Distance of ♃ from ⊙ in his Orbe 502064.

Argument of Latitude, wch gives the Inclination of ♃ 1′ 21″, the Reduction 29″, and the Curtation 83 parts.

502064	♃ from ⊙ in his Orbite.
83	Curtation substract.
501981	Distance of ♃ curtated.
101398	Distance of Earth from ⊙.

Summe	603379	3,780589
Difference	400983	3,602692
Tangent of	43d 54′ 47″,	9,983520
		13,586212
Tangent of	32 35 9	9,805623
Aggr.	76 29 56	Ang. of Elong.
Diff.	11 19 38	Paral. of Orb.

Sine of the angle of Elongation	76d 29′ 56″,	9,987829
Sine of the angle of Commutat.	87 49 35;	9,999687
Co-tangent of the Inclination.	1 1 21	11,748413
		21,748100
Co-tangent of the Latitude	59′ 42″:	11,760271

♂	S D ′ ″
Middle motion of ♂.	0 07 06 37
Aphelion of ♂ substract.	4 29 52 56
Anomalie of the Excentr.	7 07 13 41
Æquation Adde.	06 59 14
Place of ♂ from ⊙ in his Orbite.	0 14 5 51
Node Ascend. substract.	1 17 15 07
Argument of Latitude.	10 26 50 44
Reduction adde.	44
Place of ♂ from ⊙ in the Eclipt.	0 14 06 35
Place of the Sun from the Earth.	4 14 51 02
Anomalie of Commutation.	4 00 44 27
Half summe.	60 22 13
Parallax of the Orbe Adde.	1 14 08 43
True mot. of ♂ from the Earth.	1 28 15 18
Videlicet	♉ 28 15 18

Distance of ♂ from ⊙ in his Orbite 141643.

The Inclination of ♂ is 1d 0′ 42″.

Reduction 44″, and the Curtation 23 parts.

141643	♂ from ⊙ in his Orbite.
23	Curtation substract.
141620	The Distance Curtated.
101398	Distance of Earth from ⊙.

Summe	243018,	3,385638
Differ.	40222;	2,604464
Tangent of	60d 22′ 13″,	10,245068
		12,849532
Tangent of	16 13 30	9,463894
Aggr.	76 35 42,	Ang. of Elog.
Diff.	44 8 43,	Paral. of Orb.

Sine of the angle of Elongation	76d 35′ 43″,	9,988004
Sine of the angle of Commutation	59d 15′ 33″;	9,934240
Co-tangent of the Inclination	1d 0′ 42″,	11,753039
		21,687279
Co-tangent of the Latitude of ♂	1d 8′ 42″:	11,699275

The Difference of Longitude was 5′ 47″, and the Difference of Latitude 9′, hence the Difference of the Calculation from the Observation is little above one minute, which æqualizeth the Parallax of ♂ from ♃, and therefore agrees exactly with the Observation I made at *North-Luffenham.*

§ 7. *Observations of* Venus.

A*Nno* 1649 *Aprill* 11ᵈ 11ʰ *P. M.* I heedfully observed the true place of ♀, by her Application to the fixed stars, and by help of a large Instrument curiously divided, I found her true place according to Longitude 17ᵈ 30′ ♊, and her Latitude 2¹⁄₇ towards the North, and in this Observation, I considered her Parallax and Refraction &c.

	S	D	′	″	
Middle motion of the ☉.	1	0	20	14	
Aphelion of ☉ substract.	3	6	33	3	
Anomalie of the ☉.	9	23	47	11	
Æquation adde.		1	51	13	
Distance of ☉ from the Earth	100748				
True place of the ☉.	1	2	11	27	*viz.* 2ᵈ 11′ 27″ ♉.

	S	D	′	″
Middle motion of ♀.	5	12	42	49
Aphelion substract.	10	05	06	37
Anomalie of the Excent.	7	07	36	12
Æquation Adde.			29	14
Place of ♀ from ☉ in her Orbite.	5	13	12	3
Node Ascend. substract.	2	13	28	22
Rests.	2	29	43	41
Reduction substract.				2
Place of ♀ from ☉ in the Eclipt.	5	13	12	01
True Place of the ☉.	1	2	11	27
Anomalie of Commutation.	4	11	00	34
Half summe.		65	30	17
Parall. of Orbe adde to ☉ place.	1	15	16	42
Place of ♀ from the Earth.	2	17	28	9

Distance of ♀ from ☉ in her Orbite 71910.

The Argument of Latitude, with which I finde the Inclination 3ᵈ 22′ 50″, the Reduct. 2″, & the Curt. 126.

71910 Dist. of ♀ fro ☉ in her Orb.
126 Curtation substract.

71784 Distance of ♀ from ☉ Curt.
100748 Distance of Earth from ☉.

Summe	1725|32,	4,236870
Differ.	2896|4;	3,461858
Tang. of	65ᵈ 30′ 17″,	10,341390
		13,803248
Tang. of	20 13 35,	0,566378
Diff.	45 16 42. Parallax of Orb.	

Sine of the angle of Elongation	45ᵈ 16′ 42″,	9,851584
Sine of the angle of Commutation	48 59 26;	9,877717
Co-tangent of Inclination	3 22 50,	11,228630
		21,106347
Co-tangent of the Latitude of ♀. 3ᵈ 11′ 11″:		11,254763

Agreeing neer to Observation.

Anno

Anno 1574, *September* 16d at 4h *A. M. Michael Mæstlin* saw ♀ cover the *Lyons Heart*. *Mæstlin Epit. Astron. pag.* 519. *& Kepler in Astron. Opticâ pag.* 305.

For the Difference of Meridians I deduct 36′, from the time given, and the Residue 3h 24′ is the time of the observation in the Meridian of *London*, to which time I have form'd the following Paradigma.

	S	D	′	″	
Middle motion of the ☉.	6	4	27	26	
Aphelion of the ☉ substract.	3	5	16	28	
Anomalie of the ☉.	2	29	10	58	
Æquation of ☉ substract.		2	2	49	
Distance of the Earth from ☉.		100056			
Place of ☉ from the Earth.	6	2	24	37	viz. ♎ 2d 24′ 37″

	S	D	′	″
Middle motion of ♀.	2	24	37	47
Aphelion substract.	10	03	59	30
Anomalie of the Excent.	4	20	38	17
Æquation substract.			30	24
Place of ♀ from ☉ in her Orbite.	2	24	07	23
Node Ascend substract.	2	12	43	37
Rests	0	11	23	46
Reduction substract.			01	10
Place of ♀ from ☉ in the Eclipt.	2	24	06	13
Place of ☉ from the Earth.	6	02	24	37
Anomalie of Commutation.	8	21	41	36
The Complement to 12 Signes.	3	08	18	24
The half summe,		49	09	12
Parallax of the Orb substract.	1	08	26	10
Place of ♀ from the Earth.	4	23	58	27
That is.	♌	23	58	27

Distance of ♀ from ☉ in her Orbite 71920.

Argument of Latitude, therefore the Inclination is 0d 40′ 3″, the Reduction 1′ 10″, & the Curt. 5 parts.
100056, Distance of Earth frō ☉.
71915 Distance of ♀ Curtated.

Summe 171971	4,235455
Differ. 28141	3,449339
Tang. of 49d 9′ 12″,	10,063184
	13,512523
Tang. of 10 43 2	9,277068
38 26 10 Paralla. of Orb.	

Sine of the angle of Elongation 38d 26′ 10″,	9,793540
Sine of the angle of Commutation 81d 41′ 36″,	9,995419
Co-tangent of the Inclination 0d 40′ 3″,	11,933654
	21,929073
Co-tangent of the Latitude 25d 1 0′	12,135533

The true place of *Cor Leonis*, was at the time of this Observation in 23d 54′ 46″ ♌, and the Latitude thereof 26′ and a half North, therefore the Difference of Longitude was 3′ 41″, and the Difference of Latitude 1′ 20″, and in regard the Parallax of ♀ was litile or nothing, it appears (by Calculation) that ♀ then touched the *Lyons Heart*, and did Eclipse it exactly about half an hour before 4h in the morning.

§ 8. *An Observation of* Venus *and* Mercury.

ANno 1644, *February* 14d at 6h *P. M.* I observed ♀ and ☿ neer together in the West, at which time I took their Distance, finding it to be 3d and a half, ☿ bearing from ♀ towards the North-West. And this Observation I made at *North-Luffenham* with great heed and circumspection, being at that time very desirous to try the verity of *Keplers* Tables.

The Operation.

	S	D	′	″	
Middle motion of the ☉.	11	4	9	32	
Aphelion of the ☉.	3	6	27	45	
Anomalie of the ☉.	7	27	41	47	
Æquation Adde.		1	45	13	
Distance of the Earth from ☉.		99072			
True place of ☉ from the Earth.	11	5	54	45	*viz.* $5^d\ 54'\ 45''$ ♓

	S D ′ ″	
Middle motion of ♀.	0 25 29 21	
Aphelion substract.	10 05 01 58	Distance of ♀ from ☉ in her Orbite 72389.
Anomalie of ♀.	2 20 27 23	
Æquation substract.	46 45	Argument of Latitude, which giveth the Inclination of ♀ $2^d\ 32'\ 22''$ South, the Reduction $2'\ 57''$, and the Curtation 72 Parts.
Place of ♀ from ☉ in her Orbite.	0 24 42 36	
Node Ascend. substract.	2 13 25 16	99072 Earth from ☉.
Rests.	10 11 17 20	72317 ♀ from the ☉ Curt
Reduction adde.	2 57	
Place of ♀ from ☉ in the Eclipt.	0 24 45 33	Summe 171389 — 4,233998
Place of the Sun from the Earth.	11 05 54 45	Differ. 26755 — 3,427404
Anomalie of Commutation.	1 18 50 48	Tang. of $24^d\ 25'\ 24''$, — 9,657162
Half summe.	24 25 24	13,084566
Parallax of the Orbe Adde.	20 22 06	Tang. of 4 3 18 — 8,850583
True mot. of ♀ from the Earth.	11 26 16 51	Diff. 20 22 6 Parallax of Orbe.

Sine of the angle of Elongation	$20^d\ 22'\ 6''$,	9,541646
Sine of the angle of Commutat.	48 50 48;	9,876766
Co-tangent of the Inclination.	2 32 22	11,353100
		21,229866
Co-tangent of the Latitude ♀	$1^d\ 10'\ 28''$:	11,688220

	S D ′ ″	
Middle motion of ☿.	2 18 56 25	
Aphelion substract.	8 14 03 18	Distance of ☿ from ☉ in his Orbe 30555.
Anomalie of ☿.	6 04 53 07	
Æquation Adde.	02 33 29	
Place of ☿ from ☉ in his Orbite.	2 21 29 54	The Inclination $4^d\ 14'\ 25''$ North, the Reduction $12'\ 7''$, & the Curtat. 105.
Node Ascend. substract.	1 13 34 42	therefore the Distance Curtat is 30450
Argument of Latitude.	1 07 55 12	99072 Earth from ☉.
Reduction substract.	12 07	30450 ☿ from ☉.
Place of ☿ from ☉ in the Eclipt.	2 21 17 47	Summe 129522, — 4,112343
Place of ☉ from the Earth.	11 05 54 45	Differ. 68622; — 3,830463
Anomalie of Commutation.	3 15 23 02	Tang. of $52^d\ 41'\ 31''$, — 10,118034
Half summe.	52 41 31	13,954497
Parall. of Orbe adde.	17 52 56	Tang of 34 48 35, — 9,842154
Place of ☿ from the Earth.	11 23 47 41	Diff. 17 52 56 Parallax of Orbe.

Sine of the angle of Elongation	$17^d\ 52'\ 56''$,	9,487225
Sine of the angle of Commutat.	74 36 58;	9,984153
Co-tangent of the Incliuation	4 14 25,	11,129934
		21,114087
Co-tangent of the Latitude of ☿	1 21 9	11,626862

The

The Difference of Longitude is 2ᵈ 29′ 10″, and the Difference of Latitude 2ᵈ 31′ 37″, and therefore ♀ was distant from ♀ 3ᵈ 32′ towards the North West, agreeing to Observation.

Anno 1598 *September* 14ᵈ 15ʰ *P. M. John Kepler* observed (at *Grats* in *Stiria*) that the *Lyons Heart* was covered by the morning star *Venus*. *Kepler Astron. Opt. pag.* 305.

For the Difference of Meridians, I deduct from the time given 1ʰ 2′ and the Residue 13ʰ 58′ was the time at *London*.

The Operation.

☉	S	D	′	″
Middle motion of ☉.	6	3	35	32
Aphelion of ☉ substract.	3	5	41	7
Anomalie of the ☉.	2	27	54	25
Æquation substract.		2	2	39
Distance of ☉ from the Earth.	100095			
True place of the Sun.	6	1	32	53

viz. 1ᵈ 32′ 53″ ♎.

	S	D	′	″
Middle motion of ♀.	2	27	34	41
Aphelion substract.	10	4	21	6
Anomalie of ♀.	4	23	13	35
Æquation Substract.			28	41
Place of ♀ from ☉ in her Orbite.	2	27	6	00
Node Ascend. substract.	2	12	58	00
Rests.	0	14	8	00
Reduction substract.			1	25
Place of ♀ from ☉ in the Eclipt.	2	27	4	35
Place of ☉ from the Earth.	6	1	32	53
Anomalie of Commutation.	8	25	31	42
Complement to the Circle.	3	4	28	18
The half.		47	14	9
Parallax of the Orbe, substract.	1	7	11	2
True place of ♀ from the Earth.	4	24	21	51

Distance of ♀ from ☉ in her Orbe 71906.

Argument of Latitude: hence the Inclination of ♀ is 0ᵈ 49′ 31″ the Reduction 1′ 25″ and the Curtation 8 parts.

100095. Earth from the ☉.
71898. ♀ from the ☉ Curt.

Summe	171993	4,235511
Difference	28197	3,450203
Tangent of	47ᵈ 14′ 9″,	10,033929
		13,484132
Tangent of	10 3 7	9,248621
Dif.	37 11 2	Parallax of the Orbe.

Sine of the Angle of Elong.	37ᵈ 11′ 2″	9,781306
Sine of the Angle of Commutat.	85 31 42	9,998676
Co-tangent of the Inclination	co 49 31	11,841493
		21,840169
Co-tangent of the Latitude ♀ 30′ 1″		12,058863

The true Longitude of the Lions Heart at the time of this Animadversion was ♌ 24ᵈ, 15′ 2″, with Latitude 26⅓′ North, therefore their Difference of Longitude was 5¼′, and their difference of Latitude 3⅔′. But because it was observed in, or neer the Horizon, the said stars appeared of a greater magnitude then commonly they seem to be of elswhere, and therefore to the eye, ♀ might seem to hide *Cor Leonis*: Besides, if the Observation were taken at their rising, as is affirmed, the Distance of their Centers was not then above 3′, which the Diameter of ♀ exceeded, and therefore must needs cover the star, as *Kepler* observed.

In

In some of the former Observations its left doubtfull whether they were applyed to the middle, or apparent time, therefore have I accommodated the Calculation to the time given, which should have been rectified by the Æquation of Civill Days, and so peradventure in some of them; there may arise a little difference, if duly considered, but I have waved such niceties, because that difference can never extend to a minute in any of the Planets, excepting the Moon, which we have æquated, in respect of her swift motion.

§ 9. *An Eclipse of the* Moon, *observed* May 5, 1650.

On Sunday the fifth of *May* this present yeer 1650, my worthy friend Mr *Robert Billingsley*, & my self, being together in *Rutland*, we waited to observe the Moons Eclipse, but in respect of the interposition of Clouds between our sight and the Moon, we could make no remarkable Observation till the End, which by two severall Observations, we found to be exactly at 9 houres, and 12 minutes *P. M.*

Calculus hujus Eclipseos Lunæ.

		D / S	H / D	m / ′	s / ″
Middle Opposition of the Luminaries.	*May*	5	1	29	57
Intervall of the middle and true Opposition.			6	13	23
Middle time of the true Opposition.	*May*	5	7	43	20
Æquation of time.	*Adde*			6	47
The apparent time of the true Opposition.		5	7	50	7
Anomalie of the Sun Co-æquate.		10	17	2	59
Anomaly of the Moon Co-æquate.		5	9	52	56
True motion of the Moons Latitude from ☊.		6	7	46	43
Ergo, her true Latitude.	*South Desc.*			40	33
True place of the Sun.		1	24	59	21
True place of the Moon in her Orbite.		7	24	59	21
Reduction.	*Substr.*			1	53
True place of the Moon in the Ecliptique.		7	24	57	28
Hourly motion ☉				2	24
Hourly motion ☾				37	47
Hourly motion ☾ from ☉.				35	23
By which dividing the Reduction, the Quotient in time is	*Adde*			3	11
Therefore the adæquate time of the true ☍ ☉☾.	*May*	5	7	53	18
Semidiameters of the ☾.				16	56
Semidiameters of the shadow.				46	42
Aggregate of their Semidiameters,				63	38
Scruples deficient.				23	5
Digiti ergò Ecliptici 8 10′ 47″.					
Minutes of incidence.				49	2
Time of Incidence.			1	23	8
Totall Duration.			2	46	16
Distance of the true ☍ from the greatest Obsuration in time.	*Substr.*			5	59
Therefore the greatest Obscuration.	*May*	5		47	19

Hence	H	′	″	
The beginning	6	24	11	*P. M.*
The greatest Obscuration.	7	47	19	*P. M.*
The true Opposition.	7	53	18	*P. M.*
The End.	9	10	27	*P. M.*

Being consentaneous to Observation.

Two

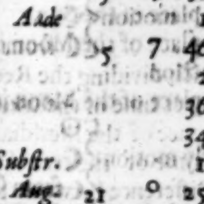
§ 10. *Two remarkable Eclipses of the* Sun, *observed by* Clavius, *whereof the first he beheld at* Conimbria *in* Portugall, *the other at* Rome.

ANno 1560, *August* 21, about noon, he observed at *Conimbria*, (whose Longitude is 11^{d}. 45′, Latitude 40^{d}. 15′) that the whole body of the Sun was Eclipsed for some pretty space of time, yea, and that in a most strange manner, as he testifies in the fourth Book, of his Comment. upon *Joan. de Sacro Bosco Pag.* 594 *Edit postr.* where his words are: *Circa Meridiem observavi Eclipsin Solis, in qua interponebatur Luna directè inter visum, ac Solem, ita ut totum Solem non modico temporis intervallo contegeret, essentq; tenebræ quodammodo majores quam nocturnæ. Neque enim ubi pedem quis poneret, videre poterat, clarissimeque in Cœlo stellæ apparebant (& quod mirabile erat) aves ex aëre in terram præ horrore obscuritatis decidebant.*

A Calculation of the said Eclipse.

		D	H	m	s
		S	D	′	″
Middle Conjunction ☉ ☾ at *London* 1560.	*August*	20	20	53	38
The Intervall to be added.			3	36	35
Middle time of the true Conjunction at *London.*	*August*	21	0	30	13
Æquation of time.	*Substract.*			3	9
Apparent time of the true Conjunction at *London.*	*Aug.*	21	0	27	4
Anomaly of the ☉ Coæquate.		2	3	57	41
Anomaly of the ☽ Coæquate.		4	13	6	11
The true place of the Sun.		5	7	45	51
The true place of the Moon in her Orbite.		5	7	45	51
Anomaly of the Moons Latitude.		5	25	31	1
Reduction.	*Adde*			1	6
Place of the ☾ in the Ecliptique.		5	7	46	57
Hourely motion ☉				2	26
Hourely motion ☾				36	27
Hourely motion ☾ from ☉				34	1
By which dividing the Reduction, the Quotient in time is.	*Substr.*			1	56
The exact time of the true ☌ at *London.*	*Aug.*	21	0	25	8
Difference of the Meridians of *London* and *Conimbria.*	*Substract.*			37	0
The exact time of the true ☌ at *Conimbria*	*Aug.*	20	23	48	8
The Difference between the true and visible ☌.				35	2
The time of the visible ☌ at *Conimbria.*	*Aug.*	20	23	13	6
The Latitude of the Moon.	*North.*			25	18
The Parallaxis of Latitude of Sun from Moon.	*South.*			25	20
The apparent Latitude of Sun from Moon,	*South,*				2
Semidiameter of the Sun.				16	19
Semidiameter of the Moon.				16	43
The Summe of the Semidiameters.				33	2
The part deficient.				33	0
The Digits Eclipsed.	*Dig.*		12	8	5

Hence it appears the Eclipse was totall, and that the body of the Moon did more then cover the body of the Sun, for the limb of the Moon exceeded the Suns limb on the South side 26″, and on the North side 22″ as the Figure demonstrates, so that the Calculation agrees exactly with the Observation of *Clavius.*



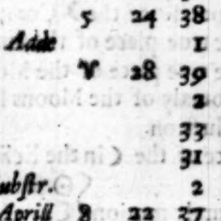
The

The other centrall Eclipse of the Sun which *Clavius* mentions, befell at *Rome* 1567. *Aprill* 9^d. about noone, where *Clavius* observed the whole body of the Moon to be conteined within the compasse of the Sun, insomuch that there appeared a bright shining Circle round about the Moon, as his words in the fore-mention'd place will best testifie: *Alteram ☉ Eclipsin Romæ anno 1567. Apr. 9. circa etiam meridiem conspexi, in qua rursus Luna, etsi inter visum ac Solem interiiciebatur, non totum tamen Solem obscurabat, ut in priori, sed relinquebatur in Sole circulus quidam exilis undique totam Lunam ambiens. Clavius* pag. 594. in Sphær. *Jo. de Sacro Bosco.*

A Calculation of the said Eclipse.

		D S	H D	m ′	s ″
Middle Conjunction ☉☾ at *London* 1567.	*Aprill*	8	9	6	18
The Intervall to be added.			13	29	3
Middle time of the true Conjunction at *London*.	*Aprill*	8	22	35	21
Æquation of dayes to be added.	*Adde*			4	23
Apparent time of the true Conjunction at *London*.	*Aprill*	8	22	39	44
Anomaly of the ☉ Coæquate.		9	22	33	36
Anomaly of the ☾ Coæquate.		3	4	43	1
The true place of the Sun.		♈	28	38	17
The true place of the Moon in her Orbite.		♈	28	38	7
Anomaly of the Moons Latitude.		5	24	38	27
Reduction.	*Adde*			1	18
Place of the ☾ in the Ecliptique.		♈	28	39	25
Hourely motion ☉				2	26
Hourely motion ☾				33	54
Hourely motion ☾ from ☉				31	28
By which dividing the Reduction, the Quotient in time is.	*Substr.*			2	29
The exact time of the true ☌ at *London*.	*Aprill*	8	22	37	15
Difference of the Meridians of *London* and *Rome* adde.			1	6	00
Exact time of the true ☌ at *Rome*.	*Aprill*	8	23	43	15
The Difference between the true and visible ☌.	*Adde*			21	31
The time of the visible ☌ at *Rome*.	*Aprill*	9		4	46
The Semidiameter of ☉				16	20
The Semidiameter of ☾				16	16
The Summe of the Semidiameters.				32	36
The Latitude of the ☾ seen.	*North*			00	1
The parts deficient.				32	35
Ergò, The Digits Eclipsed.	*Dig.*		11	58	9

By this *Paradigma*, it appeares that the whole body of the Moon was comprehended within the compasse of the Sun, and that there appeared a bright shining circle round about the Moon, as *Clavius* observed, and as this figure demonstrateth.



To

§ 11.

TO supply a vacant page, I shall here insert a generall Rule, whereby to presage the Colours of the Eclipse of the Sun and Moon, according to that Doctrine delivered to us by *Alphonsus* and his followers.

A Table shewing the colour of the Moons *Eclipse.*

The first part of the Table.

Minutes of the true Latitude of the Moon.	Colour
0, 2, 4, 6, 8	Most Black.
10, 12, 14, 16, 18, 20	Black mixed with some Greennesse.
22, 24, 26, 28, 30	Black with Rednesse.
32, 34, 36, 38, 40	Black with Palenesse.
42, 44, 46, 48, 50	A Pale Ash-colour.
52, 54, 56, 58, 60	A White Ash-colour.

The second part of the Table.

Signs and Degrees of the Moons Anomaly. S	D	Colour	Signs and Degrees of the Moons Anomaly. S	D
0	0	A Reddish colour.	12	0
0	10		11	20
0	20	A White Ash-colour.	11	10
1	0		11	0
1	10		10	20
1	20	An Ash-colour.	10	10
2	0		10	0
2	10		9	20
2	20	A Pale Black.	9	10
3	0		9	0
3	10		8	20
3	20	Black mixed with Rednesse.	8	10
4	0		8	0
4	10		7	20
4	20	Black mixed with greennesse.	7	10
5	0		7	0
5	10		6	20
5	20	Pitchy Black.	6	10
6	0		6	0

A Table shewing the Colour of the Suns *Eclipse.*

Distance of the Sun from ☊ or ☋. Degree	Colour
1	Exceeding black.
2	Mysty black.
3	A Brown black.
4	A Brown mixed with Yellow.
5	A lightsome brown.
6	A reddish brown.
7	Reddish and Yellow.
8	Reddish and Yellow.
9	A grey ruddish colour.
10	A russet grey.
11	Yellow.
12	A white Yellow.

Enter the Table of the Colour of the ☾ Eclipse, finding the ☾ Latitude in the first part, and her Anomalie in the second part, and the colours there found being mixed together, (as Painters use to do) will shew the true colour thereof; But in the latter, enter with the distance of ☉ from ☊, and the colour thereof will appear.

§ 12. *Observations of the* Planets *places made by* Tycho Brahe, Longomontanus, *and other the most approved Writers: the time of each* Observation *being reduced to the* Meridian *of* London.

Observations of Saturn.

Time given, Old-style.

Year	*Moneths*	D	H	′	*Place ♄ obser.*			*Latitude observed.*
1582	August	21	1	10	♓	7	26	in ☍ ☉
1583	September	3	0	10	♓	19	50	in ☍ ☉
1584	September	15	5	40	♈	2	34	in ☍ ☉
1585	September	28	18	40	♈	15	39	in ☍ ☉
1586	October	12	10	10	♈	29	2	in ☍ ☉
1587	October	26	6	10	♉	12	46	in ☍ ☉
1588	November	8	9	20	♉	26	44	in ☍ ☉
1589	November	22	13	40	♊	10	53	in ☍ ☉
1590	February	8	7	10	♊	7	32	Latitude 1d 30′ South.
1590	September	7	11	10	♊	28	6	Latitude 1 11 South.
1590	December	6	19	40	♊	25	10	in ☍ ☉
1587	January	9	9	0	♈	26	8	Latitude 2d 28′ South.
1590	December	21	0	10	♋	9	24½	in ☍ ☉
1591	December	9	12	0	♋	10	21	Latitude 0d 33′ South.
1592	January	8	9	10	♋	23	8	Latitude 0 8½ North.
1594	December	10	7	0	♌	24	30½	Latitude 1 18½ North.
1595	January	30	20	10	♌	21	15½	Latitude 2 37 North.
1600	January	25	15	44	♎	28	31½	Latitude 2 39 North.
1600	February	11	15	10	♎	28	19½	Latitude 2 43 North.
1608	July	9	2	10	♑	26	53	in ☍ ☉
1609	July	21	12	10	♒	8	31	in ☍ ☉
1610	August	2	21	40	♒	20	10	in ☍ ☉
1611	August	15	15	10	♓	2	12	in ☍ ☉
1639	September	6	8	10	♒	12	37½	
1640	October	2	8	10	♒	23	56½	
1641	August	19	10	18	♓	9	34½	

Observations of Jupiter.

Years	*Moneths*	D	H	′	*Place observed*			*Latitude observed*
1583	September	6	19	20	♓	23	33	in ☍ ☉
1584	October	13	6	30	♉	0	22	in ☍ ☉
1585	September	12	5	20	♓	28	56	
1587	January	14	8	10	♋	7	19	Latitude 0d 8′ North.
1588	October	16	18	10	☌	♃	♂	♂ Elevated above ♃ about the Diameter ☾.
1589	January	29	12	33	♍	15	43	Latit. ♃ 1d 28′ North.
1596	October	18	11	10	♉	5	40½	in ☍ ☉
1600	March	5	9	10	♌	12	33½	Latitude 1d 7′ North.
1598	December	28	11	0	♋	14	40	Latitude 0 23 North.
1607	September	17	10	20	♈	4	10	in ☍ ☉
1610	December	30	13	50	♋	19	36	in ☍ ☉
1613	March	1	21	10	♍	21	45½	in ☍ ☉
1594	August	6	8	23	♒	22	15½	in ☍ ☉

Observa-

Observations of Mars.

Year	*Moneths*	D	H	′	*Place observed*			*Latitude observed.*
1580	November	18	0	41	♊	6	28½	in ☍ ☉
1582	December	28	3	8	♋	16	55½	in ☍ ☉
1585	January	30	18	24	♌	21	36½	in ☍ ☉
1587	March	6	6	33	♍	25	43	in ☍ ☉
1589	Aprill	14	5	33	♏	4	23	in ☍ ☉
1591	May	13	13	0	♑	2	20	
1591	June	8	6	53	♐	26	43½	in ☍ ☉
1585	May	10	17	20	♌	26	54½	
1586	December	31	18	18	♎	1	4½	Latitude 1ᵈ 54′
1589	November	1	5	20	♑	20	59½	Latitude 1 36 South.
1591	September	26	6	20	♑	18	36	Latitude 1 36 South.
1593	August	25	16	37	♓	12	16	in ☍ ☉
1595	October	30	13	49	♉	17	31½	in ☍ ☉
1597	December	13	15	4	♋	2	28	in ☍ ☉
1600	January	18	13	12	♌	8	38	in ☍ ☉
1600	March	6	7	43	♋	29	18	Latitude 3ᵈ 22′ North
1585	March	12	9	40	♌	11	46	Latitude 3 22 North.
1586	December	15	17	40	♍	26	6	Latitude 2 35 North.
1602	February	20	13	23	♏	12	27	in ☍ ☉
1582	November	23	15	10	♋	26	38½	Latitude 2 49′ North.
1583	January	26	5	25	♋	8	20	Latitude 3 52 North.
1589	March	8	15	34	♏	12	17	Latitude 2 4 North.
1587	January	25	16	10	♎	4	42	Latitude 3 26 North

Observations of Venus

Years	*Moneths*	D	H	′	*Place observ.*			*Latitude observed*
1587	March	2	16	40	♓	10	7	
1585	September	14	16	25	♌	15	55	Latitude 2 8 North.
1588	December	14	18	50	♏	17	10	Latitude 3 10 North.
1590	December	17	19	10	♐	20	0	Latitude 0 27 North.
1592	February	17	16	40	♑	22	23	Latitude 2 56 North.
1594	December	17	4	10	♒	22	58	Latitude 1 6⅓ South.
1600	February	21	17	50	♑	16	26	Latitude 3 20 North.
1601	May	9	7	27	♋	4	19	Latitude 3 9 North.
1610	December	12	3	50	♒	17	58	Latitude 1 29 South.
1633	May	16	9	0	♋	18	17	Latitude 2 48 North.
1585	November	14	18	10	♏	13	4	Latitude 2 18 North.
1585	November	23	18	30	♏	25	2	Latitude 1 25 North.
1587	January	9	4	0	♒	17	42	Latitude 0 2 North.
1590	March	6	6	8	♈	13	44	Latitude 1 42 North.
1592	February	3	4	58	♓	12	20	Latitude 0 47 North.
1593	May	11	8	48		23	16	Latitude 2 0 North.
1586	October	24	18	20	♎	22	35	
1634	January	2	6	28	♒	1	31	*Stylo novo* Latit. 0ᵈ 57′ South.
1635	January	12	17	40	♑	8	22	Latitude 1 39 North.
1607	Aprill	15	8	10	♉	21	5	Latitude 1 40 North.

Observations of the Moon.

Years	*Moneths*	D	H	′	*Place observed*			*Latitude observed*
1587	January	9	6	10	♊	1	0½	4 29 15 South
1587	January	14	12	49	♌	10	40	5 3 57 South
1587	August	4	8	23	♍	7	51	4 15 30 North
1590	December	28	9	31	♊	24	32	3 14 0 South
1591	August	23	8	15	♓	0	43	4 30 34 South
1591	December	20	13	24	♌	4	56	2 0 39 North
1592	May	7	8	30	♌	21	52½	3 31 26 North
1594	December	21	5	10	♌	29	38½	3 59 20 North
1600	Aprill	10	6	42	♌	16	21½	1 33 40 South. *And this was*
1641	June	10	9	48	♏	28	11½	*the last Observation of that Tres-noble*
1639	March	28	9	6	♊	7	39	Tycho Brahe.
1641	June	14	11	3	♑	29	33	4 58 49 North.

§ 13 *Observations of Eclipses of the* Moon.

ANno 1462, the 11d of *June*, the Moon was Eclipsed, whose middle *Regiomontanus* observed at *Viterb* in *Italy*, 14h 48′ *P. M.* when she was darkened 7 Dig. on her North side, *Regiomont. in Torqueto.*

Anno 1500 *November* 5. was an Eclipse of the Moon, whose middle was observed at *Rome* by *Copernicus* at 14h 0′ *P. M.* being then 10 Digits Eclipsed.

Anno 1511, *October* 6d the Moon was Eclipsed totally, whose beginning *Copernicus* observed at *Fruenburg* in *Prussia*, at 10h 52′ *P. M.*

Anno 1522. *September* 5d happened an Eclipse of the Moon, the beginning whereof *Copernicus* observed at *Fruenburg* in *Prussia*, at 11h 36′, and this was totall, see *Cop. Lib.* 4. *Cap.* 5. *Revolut.*

Anno 1560, the 11 of *March* was a Partile Eclipse of the Moon, whose beginning *Cornelius Gemma* observed at *Lovane* at 15h 40′.

Anno 1580, *January* 31d happened a Full-Moon Eclipse, whose middle Noble *Tycho* observed at *Uraniburg* in *Denmark*, at 10h 9′ *P. M.* she being then all darkned.

Anno 1588, the 2d of *March* hapned a totall Obscuration of the Moon, the middle whereof was at *Uraniburge* 15h 8′ *P. M.*

Anno 1591, *July* 7d. *Michael Mastlin* observed an Eclipse of the Moon at *Tubing*, and when the Center of the Sun was appearing above the Horizon, he saw the Moon two degrees high, Eclipsed on her South side, and contrariwise, when the Moon set in the West, (which was a little before the middle of the Eclipse) he observed the Sun elevated above the Horizon two degrees.

Anno 1601, *November* 29d, was an Eclipse of the Moon, whose middle *Lansberg* observed at *Ter-Goose* in *Zeland*, at 6h 12′ *P. M.* at which instant, she was Eclipsed above 10 Dig. on the South side.

Anno 1609, *January* 9d, was an Eclipse of the Moon, whose beginning *Lansberg* observed at *Ter-Goose*, in *Zeland*, at 1h and 5′ after midnight, and the end about 3h and a quarter after midnight, being Eclipsed at the middle thereof about 9 Digits on the North side.

Anno 1622, *February* 19d, at 9h 45′ *P. M.* was the middle of a Lunar Eclipse at *Rome*.

Anno 1628, *January* 10d, Dr. *Bainbridg* (at *Oxford*) observed an Eclipse of the Moon, the beginding at 7h 31′, the beginning of totall darknesse at 8h 23′, the end of totall darknesse at 10h 0′ 30″, and the end at 10h 57′ 30″.

§ 14 *Observations of Eclipses of the* Sun.

ANno 1560, *August* 11, about noon, *Clavius* observed the Sun for some space of time to be totally Eclipsed, insomuch that the darknesse was so great at *Conimbria* in *Lusitania*, (where he so observed it) that the stars at mid-day appeared bright and shining, and the people durst not stir abroad, yea, and that which was most wonderfull, was the falling of the Birds at the horrour of the Obscuration: see *Clavius Pag.* 594 *in Sphær. Joan. de Sacro Bosco.*

Anno 1567, the 9d of *Aprill*, *Christopher Clavius* again observed a Centrall Eclipse of the Sun at *Rome* about noon, but in this Eclipse the Moon did not cover the whole body of the Sun, as in the other Eclipse 1560, but there appeared a bright shining Circle round about the Moon: see *Clavius in loco predicto.* This Eclipse *Tycho* observed at *Uraniburg* about noon, and but 6d 29′ darkned on the South side: The Calculations of these two solar Eclipses are before inserted.

Cornelius Gemma at *Lovan*, under the Latitude of 50d 50′, and Longitude of 26½ degrees, observed the beginning of this Eclipse at 10h 12′ *A. M.* and the Quantity obscured 9 Dig. on the South side.

Anno 1598, the 25d of *February* before noon, Dr. *Jessenius* observed at *Torge* in *Misnia*, (*viz.* under the Latitude of 51d 33′, and Longitude of 35d) an Eclipse of the Sun almost centrall, for all the Moon was seen within the compasse of the Sun, so that there

there appeared a bright shining Circle round about the Moon: *Kepler Astron. Opt. Pag.* 299 & 419.

Anno 1601 was an Eclipse of the Sun, *December* 14, the middle whereof was observed by *Kepler* at *Prague* in *Bohemia*, about 2 a clock, and 3′ *P. M.* at which instant the Sun was Eclipsed full 8 dig. *Kepler Astron. Opt. Pag.* 433.

This Eclipse was also observed by the Fisher-men upon the sea shore, neer *Burgen* in *Norway*, under the Latitude of 60d 30′; and Longitude of 27d and a half, where they with great admiration saw the whole body of the Moon to be conteined within the Sun, so that there did appear a bright Circle round about the Moon, about a digit and a half, see the second part of *Astronomia Danica. Pag.* 165.

Anno 1605, *October* 2d was an Eclipse of the Sun, whose middle was observed at *Middleburg* by *John Rotarius*, about a quarter of an hour past one a clock in the afternoon, at which time the Sun was obscured above 10 Digits, and lesse then 11 Digits.

This Eclipse was also observed at *Naples* in *Italy*, where the whole Sun was covered by the dark body of the Moon, which then interposed: *Kepler Epit. Astron. Copernic. Pag.* 893.

Anno 1608, was an Eclipse of the Sun, whose middle was observed by *Lansberg*, at *Ter-Goose*, 5′ past 4 *P. M.* at which time the Sun was Eclipsed on his South side two Digits and a half: *Lansberg in Thesauro Observat. Astron. Fol.* 120.

This Eclipse was also observed by that famous Astronomer *C. Longomontanus*, at *Hafnia* in *Denmark*, but the Ayr being there thick, and but very little Eclipsed, it was scarce discernable.

Anno 1621 hapned an Eclipse of the Sun, the beginning thereof *Lansberg* observed at *Middleburg*, about 7 in the morning, and the end at 36′ past 9, the parts darkned at the middle thereof being 10½.

Anno 1630, *May* 31th hapned an Eclipse of the Sun, whose beginning I observed at *North-Luffenham*, neer 6 *P. M.* and was Eclipsed about 11 Dig. at the middle thereof, but being then in my tender years, I could make no acurate Observation.

But my worthy Countriman Dr. *Bainbridge* then at *Oxford*, observed the beginning thereof to be exactly at 5h 58′, and the end at 7h 48′.

The same Eclipse *Gassendus* observed at *Paris* in *France*, where he observed the beginning at 6h 16′, and the end at 7h 12′, and in the middle he found the Digits Eclipsed to be 11 and 22′.

Anno 1639, *May* 22d, the Sun was Eclipsed, the end whereof was observed at *Leyden* in *Holland* at 6h 28′.

Anno 1645, *May* 11, I observed an Eclipse of the Sun neer 11 before noon, above five points darkned, but being then imployed in the publique affairs of the Kingdome, I wanted oportunity to make further Observation thereof.

Anno 1649, *October* 25d. hapned an Eclipse of the Sun, whose middle I observed at *North-Luffenham*, about three quarters of an hour past one a clock after noon, and the end most exactly at two a clock and 34′. The quantity Eclipsed at the middle thereof being 4¼ Dig.

This Eclipse was most exactly observed at *London*, by my kind friend Mr. *William Leybourn*, the beginning there (by Observation) was at 12h 49′ 28″, and the end at 2h 36′ 8″, for at the beginning, the Altitude of the Sun was 22d 0′, and at the end 14d 45′: The Digits Eclipsed in the middle was 4½d.

The same year 1649, upon the 31d of *May*, was a very small Eclipse of the Sun, which was observed at *S. Johns* Colledg, by my worthy and learned friend Mr. *Robert Billingsley* Mathematician, the middle was at 5h 30′, and the Quantity obscured 0⅔ of a Digit.

An

An Advertisement to the Reader.

That most admirable Mathematician John Kepler, by the help of Tycho's Observations, did make the most absolute and best restauration of Astronomy, of any that ever did precede him, having not onely framed new Tables of the Æquations of the Planets, but also endevoured by the assistance of ancient select Observations, by comparing them with Tycho's, to rectifie and establish their middle Motions, yet, nevertheless, since his time hath Bullialdus (by the help of other Observations) attempted to reform what his learned Predecessor had done, he comparing and limiting their middle Motions chiefly, by the assistance of some Observations hee found in Lib. M. C. Bibliothecæ Regis Christian. but because it so manifestly appears to every judicious eye, that the most of those Animadversions of Ptolomy and the Ancients, were fallacious and uncertain; they seldome ayming neerer then a degree (and I am certain sometime more) in the places of the Planets, I shall not therefore much dissent from what that worthy Kepler hath done, till time and observation further confirme the truth thereof, notwithstanding, I have used all the diligence I could possibly, to establish the same upon such Observations as have been made in these 200 yeers, there being more likelyhood of truth in them, then in those of ancient time, when Urania had few Favourites, however I must acknowledg the intervall of time is but small, and durst I confide in those more ancient, I might undertake to rectifie the same for many thousand yeers succeeding. What I have done, I dare aver shall not vary sensibly, (if any thing at all) from the truth of observation in many succeeding Centenaries, yet I will not say, but that they who live some Generations after our time, may have opportunity to make corrections, by comparing their Observations with those of Tycho, and with others that have been made exactly in our times. But as for the Tables of the Æquations of the Planets, I verily believe that Posterity shall not vary much from what I have done, being assured they agree to the truth of Observation. And here the judicious Reader is desired to take notice, that the middle Motions set down in my Tables, is applyed to the Meridian of London (as is declared in the first Chapter) therefore, if their Places, or Aspects be to be reduced to any other Meridian, he must first seek the true Site of his place in respect of London, else peradventure may he come to dream of an errour in the Tables when none is; for the Longitude of places being not yet thoroughly rectified, we cannot attein the difference of Meridians so exactly as wished. The Catalogue I have inserted is taken out of the most approved Writers, who have written of Geographie, yet is there to this day no small difference amongst the most notable Mathematicians, whose Works are extant, neither can I reconcile the best to agree with truth. If for instance, we do but seek to finde the difference of the Meridians of London and Rome (two eminent Cities) we shall finde their difference of Meridians by observation of Lunar Eclipses to be exactly one houre 6 minutes, wherewith Clavius agrees, whereas Maginus makes it one houre 26 minutes. Apian and Leovitius one houre 33 minutes. Lansberge one houre three minutes. Argol 57 minutes. Kepler and Eichstade 50 minutes; and Bullialdus no more then 48 minutes. I have examin'd divers other Cities of note in Europe, and compared them with the said Authors, amongst whom I find no small discrepancie, and some I have rectified by observation of Lunar Eclipses, and would my narrow limits of time have permitted, I should have endeavoured a restitution in all those places, wherein Cœlestial Observations have been made. Shortly, if occasion serve, thou mayst expect it, in the interim I desire the Reader to be cautious, in the premises.

A Table of converting Houres and Minutes, into Degrees and Minutes, of the Æquator.

Houres	Degrees of the Æquator.
1	15
2	30
3	45
4	60
5	75
6	90
7	105
8	120
9	135
10	150
11	165
12	180
13	195
14	210
15	225
16	240
17	255
18	270
19	285
20	300
21	315
22	330
23	345
24	360

Minutes	Degrees & Minutes of the Æquator D	'
1	0	15
2	0	30
3	0	45
4	1	0
5	1	15
6	1	30
7	1	45
8	2	0
9	2	15
10	2	30
11	2	45
12	3	0
13	3	15
14	3	30
15	3	45
16	4	0
17	4	15
18	4	30
19	4	45
20	5	0
21	5	15
22	5	30
23	5	45
24	6	0
25	6	15
26	6	30
27	6	45
28	7	0
29	7	15
30	7	30

Minutes	Degrees & Minutes of the Æquator D	'
31	7	45
32	8	0
33	8	15
34	8	30
35	8	45
36	9	0
37	9	15
38	9	30
39	9	45
40	10	0
41	10	15
42	10	30
43	10	45
44	11	0
45	11	15
46	11	30
47	11	45
48	12	0
49	12	15
50	12	30
51	12	45
52	13	0
53	13	15
54	13	30
55	13	45
56	14	0
57	14	15
58	14	30
59	14	45
60	15	0

A Canon or Table of Converting Houres and Minutes of an Hour, into Minutes of the Day.

H ' ''	D ' ''	' '' '''	'' ''' ''''	H ' ''	D ' ''	' '' '''	'' ''' ''''
1	0	2	30	31	1	17	30
2	0	5	0	32	1	20	0
3	0	7	30	33	1	22	30
4	0	10	0	34	1	25	0
5	0	12	30	35	1	27	30
6	0	15	0	36	1	30	0
7	0	17	30	37	1	32	30
8	0	20	0	38	1	35	0
9	0	22	30	39	1	37	30
10	0	25	0	40	1	40	0
11	0	27	30	41	1	42	30
12	0	30	0	42	1	45	0
13	0	32	30	43	1	47	30
14	0	35	0	44	1	50	0
15	0	37	30	45	1	52	30
16	0	40	0	46	1	55	0
17	0	42	30	47	1	57	30
18	0	45	0	48	2	0	0
19	0	47	30	49	2	2	30
20	0	50	0	50	2	5	0
21	0	52	30	51	2	7	30
22	0	55	0	52	2	10	0
23	0	57	30	53	2	12	30
24	1	0	0	54	2	15	0
25	1	2	30	55	2	17	30
26	1	5	0	56	2	20	0
27	1	7	30	57	2	22	30
28	1	10	0	58	2	25	0
29	1	12	30	59	2	27	30
30	1	15	0	60	2	30	0

A Canon or Table of Converting Minutes of the Day, into Houres, and minutes of an Houre.

H ' ''	D ' ''	' '' '''	'' ''' ''''	H ' ''	D ' ''	' '' '''	'' ''' ''''
1	0	24	0	31	12	24	0
2	0	48	0	32	12	48	0
3	1	12	0	33	13	12	0
4	1	36	0	34	13	36	0
5	2	0	0	35	14	0	0
6	2	24	0	36	14	24	0
7	2	48	0	37	14	48	0
8	3	12	0	38	15	12	0
9	3	36	0	39	15	36	0
10	4	0	0	40	16	0	0
11	4	24	0	41	16	24	0
12	4	48	0	42	16	48	0
13	5	12	0	43	17	12	0
14	5	36	0	44	17	36	0
15	6	0	0	45	18	0	0
16	6	24	0	46	18	24	0
17	6	48	0	47	18	48	0
18	7	12	0	48	19	12	0
19	7	36	0	49	19	36	0
20	8	0	0	50	20	0	0
21	8	24	0	51	20	24	0
22	8	48	0	52	20	48	0
23	9	12	0	53	21	12	0
24	9	36	0	54	21	36	0
25	10	0	0	55	22	0	0
26	10	24	0	56	22	24	0
27	10	48	0	57	22	48	0
28	11	12	0	58	23	12	0
29	11	36	0	59	23	36	0
30	12	0	0	60	24	0	0

A Catalogue of some of the chiefest Cities in the World,

Shewing the temporarie Difference of their Meridians from London, *with the height of the Pole in each Place. Collected out of the best Geographicall Tables now extant, and compared with the Observations of* Longomontanus, Kepler, Eichstade, Bullialdus, *and other the most approved Authors.*

Names of the Cities.	*Diff. of Merid.* H m	*Heig. Pole.* D m
Aberden in Scotland.	0 9 S	58 40
Belgrade in Hungarie.	1 24 A	45 16
Alexandria in Ægypt.	2 36 A	30 58
Anberg.	0 48 A	49 32
Amsterdam in Holland.	0 21 A	52 24
Antwerp in Brabant.	0 18 A	51 12
Aquisgrane.	0 26 A	50 48
Arim, of the Arabian Astrologer call'd the middle of the World.	5 37 A	00 00
Athens in Greece.	1 51 A	37 42
Augspurg in Swethland.	0 46 A	48 22
Orleans in France.	0 00	48 8
Bamberge.	0 43 A	49 57
Babylon in Caldea.	3 40 A	35 0
Barcino in Catalonia.	0 10 A	40 45
Bethelem.	2 46 A	31 50
Breme in Saxony.	0 34 A	53 8
Bruxles in Brabant.	0 16 A	50 48
Brunswick in Saxony.	0 41 A	52 16
Burdeaux in France.	0 12 S	45 47
Calice in France.	0 00	50 52
Calicute in East India.	5 50 A	11 30
Carthage in Affrick.	0 40 A	34 50
Cassels in Hessia.	0 36 A	51 19
Compostella in Spain.	0 38 S	43 0
Constantinople.	2 18 A	43 0
Conimbria in Lusitania.	0 37 S	40 15
Cracovia in Poland.	1 21 A	49 58
Damascus in Syria.	3 16 A	34 0
Dantzick.	1 18 A	54 23
Edenburg in Scotland.	0 11 S	57 6
Ephesus	2 17 A	38 18
Ferraria in Italy.	0 43 A	44 45
Fesse in Mauritania.	0 16 S	33 15
Francford upon Odar.	1 00 A	52 20
Francford upon Mœne.	0 32 A	50 7
Fruenburg in Prussia.	1 20 A	54 29
Gadiz, or Cadiz.	0 24 S	36 10
Geneva.	0 26 A	45 54
Gaunt in Flanders.	0 16 A	50 54
Goa in India.	5 48 A	16 0
Ter-Goose in Zeland.	0 16 A	51 30
Hamburg in Holsatia.	0 39 A	33 43
Heidelburge.	0 35 A	49 36
Hierusalem.	3 5 A	32 10
Ingolstade.	0 47 A	48 42
Lisborne in Portugall.	0 36 S	38 45
Lyons in France.	0 20 A	45 16
Leydon.	0 19 A	32 10
L O N D O N.	0 00	51 32
Lubeck in Saxony.	0 40 A	53 58
Maedeburg in Saxony.	0 47 A	52 16

Names of the Cities.	*Diff. of Merid.* H m	*Heigh. of Pole* D m
St. Malo.	0 20 S	48 44
Mexico. (Pegu.	6 50 S	20 6
Macao in the Kingdome of	7 9 A	19 30
Malico in East India.	7 19 A	2 24
Maliapur, the Sepul. of St.	6 13 A	13 0
Moroco. (Thomas.	0 31 S	31 15
Marpurg in Hessia.	0 33 A	50 43
Mecha in Arabia.	3 23 A	23 0
Messane in Sicilia.	1 6 A	37 52
Middleburg in Zeland.	0 16 A	51 30
Coningsburge, Mons regius	1 28 A	55 8
Mentz in Germany (Pr.	0 45 A	
Munster in Westphalia.	0 28 A	51 54
Madrid, seat of K. of Spain.	0 11 S	40 45
Mount Sinai.	2 40 A	30 0
Narbon in France.	0 1 A	43 26
Nassaw.	0 42 A	50 16
Ninive in Assyria.	3 38 A	35 50
Naples in Italy.	1 1 A	40 42
Norimberge in Germany.	0 46 A	49 26
Presburg in Hungary.	1 9 A	48 25
Paris in France.	0 2 A	48 51
Prague in Bohemia.	0 56 A	50 56
Padua.	0 49 A	36 25
Pergamus.	2 10 A	41 8
Quinzoy.	11 28 A	37 40
Rome in Italy.	0 50 A	42 2
Ravensburge in Bavaria.	0 41 A	47 45
Roterdam in Holland.	0 14 A	51 55
Rochell.	0 4 S	45 49
Roan in Normandy.	0 6 A	49 30
Salisburge in Bavaria.	0 54 A	47 42
Spier upon the Rhene.	0 35 A	49 24
Sterine in Germany.	0 58 A	53 36
Smyrna in Asia.	2 14 A	38 50
Stockholm in Swethland.	1 1 A	58 50
Syracusa in Sicilie.	1 5 A	36 50
Thessalonica.	1 45 A	41 32
Tripolis in Syria.	3 0 A	34 50
Tubing Wittenburge.	0 38 A	48 34
Trier.	0 26 A	49 50
Torge in Misnia.	0 53 A	51 33
Copenhage in Denmark.	0 50 A	55 43
Valence in Spain.	0 4 A	39 30
Venice.	0 48 A	45 15
Vienna in Austria.	1 5 A	48 22
Weymar.	0 46 A	51 8
Ulme in Lower Swethland.	0 42 A	48 24
Uraniburge the seat of Astrō:	0 50 A	55 54
Ulissippo in Portugall.	0 35 S	38 45
Worms.	0 29 A	50 25
Wittenburg in Saxony.	0 52 A	51 52

A Catalogue of some of the most eminent Cities and Towns in England *and* Ireland, *wherein is shewed the Difference of their Meridians from* London, *with the height of the Pole Artique. Many whereof are set down according to the Authors own Observation, the rest by their Bearing and Distance, &c.*

Names of the Cities.	Differ of Meridiãs H	m	Height of Pole D	m	*Names of the Cities.*	Differ. of Mer H	m	Heig. Pole. D	m
S. Albons.	0	1 s	51	55	Lincolne.	0	01 s	53	15
Barwick.	0	6 s	55	49	Middle of the Isle of Man.	0	17 s	54	22
Bedford.	0	2 s	52	18	Nottingham.	0	04 s	53	03
Bristol.	0	11 s	51	32	Newarke.	0	03 s	53	02
Boston.	0	0	53	2	Newcastle.	0	06 s	54	58
Cambridge.	0	1 a	52	17	N.Luffingham, *sedes Author.*	0	03 s	52	41
Canterbury.	0	5 a	51	27	Norwich.	0	04 a	52	44
Carlile.	0	10 s	54	57	Northampton.	0	04 s	52	18
Chester.	0	11 s	53	20	Oxford.	0	05 s	51	54
Coventry.	0	4 s	52	30	Okenham.	0	03 s	52	44
Carmerthen.	0	17 s	52	2	Peterborough.	0	02 s	52	35
Chichester.	0	3 s	50	56	Richmond.	0	06 s	54	26
Colchester.	0	5 a	52	4	Rochester.	0	03 a	51	28
Darby.	0	5 s	53	6	S.Michaels Mount in Corn.	0	23 s	50	38
Dublin in Ireland.	0	26 s	53	11	Stafford.	0	08 s	52	55
Duresme.	0	5 s	54	45	Stamford.	0	02 s	52	41
Dartmouth.	0	15 s	50	32	Shrewsbury.	0	11 s	52	48
Eely.	0	1 a	52	20	Tredah in Ireland.	0	27 s	53	38
Grantham.	0	2 s	52	58	Uppingham in Rutland.	0	03 s	52	40
Glocester.	0	9 s	52	00	Warwick.	0	06 s	52	25
Halifax.	0	6 s	53	49	Winchester.	0	05 s	51	10
Hartford.	0	1 s	51	50	Waterford in Ireland.	0	27 s	52	22
Hereford.	0	11 s	52	14	Worcester.	0	09 s	52	20
Huntington.	0	1 s	52	19	Yarmouth.	0	06 a	52	45
Hull.	0	1 s	53	50	York.	0	04 s	54	00
Lancaster.	0	11 s	54	8	LONDON.	0	00	51	32
Leicester.	0	4 s	52	40					

These places in *England* are for the most part exactly rectified by the Author; but the Catalogue of forreign Cities (which is collected out of the best Authors that have yet wrote) is not consentaneous to Observation: As *Uraniburge* ought to be (by my Observation) from *London* 1 houre 3 min. *Rome* 1 houre 6 min. *Paris* 10 min. *Venice* 1 houre 3 min. &c.

A Table

A Table of the Reduction of the Dayes of the Julian *Year to Dayes of the* Gregorian *Year*, & contra.

Frō the 5 of *Octo.*		*Anno Dom.* 1582	Adde Days		*Anno Dom.*	Adde Days		*Anno Dom.*	Adde Days
Frō the 24 of *Feb.*	B	1600	10		3100	22		4600	33
		1700	11	B	3200	22		4700	34
		1800	12		3300	23	B	4800	34
		1900	13		3400	24		4900	35
	B	2000	13		3500	25		5000	36
		2100	14	B	3600	25		5100	37
		2200	15		3700	26	B	5200	37
		2300	16		3800	27		5300	38
	B	2400	16		3900	28		5400	39
		2500	17	B	4000	28		5500	40
		2600	18		4100	29	B	5600	40
		2700	19		4200	30		5700	41
	B	2800	19		4300	31		5800	42
		2900	20	B	4400	31		5900	43
		3000	21		4500	32	B	6000	43

FOrasmuch as the Earth in the space of 365 Days, 5 hours, 48′ 55″, doth make her Annuall Revolution in her peculiar Orbite, departing from some known Point thereof, and returning to the same again, which we call the Tropicall year, it therefore commeth to passe, that the Julian year conteining 365 Days, 6 Hours, (as it was formerly established by the Church) must needs exceed the true year 11′ 5″, which Defect, since the first establishment thereof, hath much altered, not onely the Paschall solemnity, but also the *Equinoxes* and *Solstices*, and therefore Pope *Gregory* 13, to bring the Paschall solemnity, and the *Equinoxes* and *Solstices* to their Seats, (they were in, at the time of the Nicene Councell, *Anno* 322, (for the *Equinox* was then the 21 of *March*) he ordered, that, for its Restitution, there should be 10 days omitted in the moneth of *October* 1582, and so the 5 day should be accounted the 15, and from thence so to continue till the year 1700, *Feb.* 24, at which time the *Gregorian* year must exceed the Julian 11 days, and from that year inclusive every 4 Centenarie to be *Bissextile*, and the three former Centenaries of years, to be Common years, and no Intercalation to be observed in them, whereby every 400 years shall gain 3 days of what the Julian loses, and this is to be observed after the year 1600. See *Maginus Can. 10 & 11, in Æquab. & Apparent. Mot. Tab. & Origan. Part. 1 Ephemeridum.* The Excesse or Difference of which accounts we have till the year 6000, given you in the former Table.

When therefore you are to reduce Days of the Julian year into the Days of the Gregorian year, enter the Table, and the Days there found adde to the days of the Julian year given. Admit the time proposed were the 5 of *May* 2310, therefore against 2300, I finde 16 days, which being added to the 5 day maketh 21. So that I conclude the 5 of *May* 2310 *Stylo Juliano*, is the 21 of the same Moneth *Stylo Gregoriano.*

A Table of the Æquation of Civill Dayes (placing the Aphelion of the Earth in the 6° of *Cancer*) which may serve, without any sensible errour, for this and the ensuing Age.

Degr.	♈ Substr. ′	″	♉ Adde. ′	″	♊ Adde. ′	″	♋ Substr. ′	″	♌ Substra. ′	″	♍ Substr. ′	″	♎ Adde. ′	″	♏ Adde. ′	″	♐ Adde. ′	″	♑ Adde. ′	″	♒ Substra. ′	″	♓ Substra. ′	″
0	4	04	4	41	6	23	0	26	7	07	5	07	4	04	12	09	11	11	0	26	10	27	11	43
1	3	44	4	54	6	16	0	43	7	13	4	53	4	24	12	18	10	58	0	S 00	10	41	11	35
2	3	24	5	05	6	09	1	00	7	19	4	39	4	44	12	25	10	43	0	26	10	53	11	25
3	3	06	5	17	6	01	1	18	7	23	4	24	5	04	12	33	10	29	0	52	11	05	11	16
4	2	46	5	28	5	53	1	35	7	26	4	09	5	24	12	40	10	13	1	19	11	17	11	05
5	2	26	5	38	5	43	1	52	7	29	3	54	5	44	12	46	9	57	1	44	11	27	10	54
6	2	06	5	47	5	33	2	09	7	31	3	38	6	04	12	51	9	39	2	09	11	37	10	42
7	1	47	5	56	5	23	2	27	7	33	3	22	6	23	12	56	9	21	2	35	11	47	10	30
8	1	27	6	04	5	12	2	43	7	34	3	05	6	43	13	00	9	02	2	59	11	54	10	17
9	1	08	6	11	5	01	2	59	7	34	2	47	7	02	13	03	8	43	3	25	12	02	10	04
10	0	48	6	19	4	49	3	16	7	33	2	31	7	20	13	05	8	23	3	50	12	08	9	51
11	0	29	6	25	4	36	3	32	7	32	2	13	7	39	13	07	8	04	4	14	12	14	9	37
12	0	10	6	31	4	23	3	47	7	31	1	54	7	58	13	08	7	43	4	38	12	19	9	22
13	0	A 09	6	36	4	10	4	02	7	28	1	36	8	15	13	08	7	22	5	02	12	24	9	08
14	0	27	6	41	3	56	4	17	7	25	1	18	8	33	13	07	7	00	5	25	12	27	8	52
15	0	45	6	46	3	42	4	32	7	22	0	59	8	49	13	06	6	38	5	48	12	30	8	34
16	1	03	6	48	3	27	4	46	7	17	0	40	9	07	13	04	6	15	6	10	12	32	8	20
17	1	21	6	51	3	13	5	00	7	11	0	20	9	23	13	01	5	51	6	32	12	33	8	04
18	1	38	6	53	2	57	5	13	7	06	0	01	9	38	12	57	5	27	6	53	12	34	7	47
19	1	56	6	54	2	42	5	25	6	59	0	A 19	9	54	12	52	5	04	7	15	12	33	7	29
20	2	13	6	55	2	26	5	37	6	52	0	40	10	09	12	47	4	40	7	35	12	32	7	12
21	2	29	6	55	2	09	5	49	6	44	1	00	10	23	12	41	4	15	7	55	12	30	6	54
22	2	45	6	54	1	52	6	00	6	36	1	20	10	37	12	34	3	50	8	14	12	28	6	36
23	3	02	6	53	1	36	6	11	6	27	1	41	10	50	12	27	3	26	8	33	12	25	6	17
24	3	17	6	50	1	19	6	21	6	17	2	01	11	03	12	18	2	39	8	51	12	22	5	59
25	3	32	6	47	1	02	6	31	6	06	2	22	11	16	12	09	2	34	9	09	12	17	5	40
26	3	47	6	44	0	45	6	39	5	55	7	43	11	27	11	58	2	09	9	27	12	12	5	21
27	4	01	6	40	0	27	6	47	5	44	3	03	11	38	11	48	1	43	9	43	12	05	5	02
28	4	15	6	35	0	S 09	6	54	5	32	3	23	11	49	11	37	1	17	9	58	11	58	4	43
29	4	28	6	29	0	S 08	7	01	5	20	3	43	11	59	11	25	0	52	10	13	11	52	4	23
30	4	41	6	23	0	26	7	07	5	07	4	04	12	09	11	11	0	26	10	27	11	43	4	04

The Use.

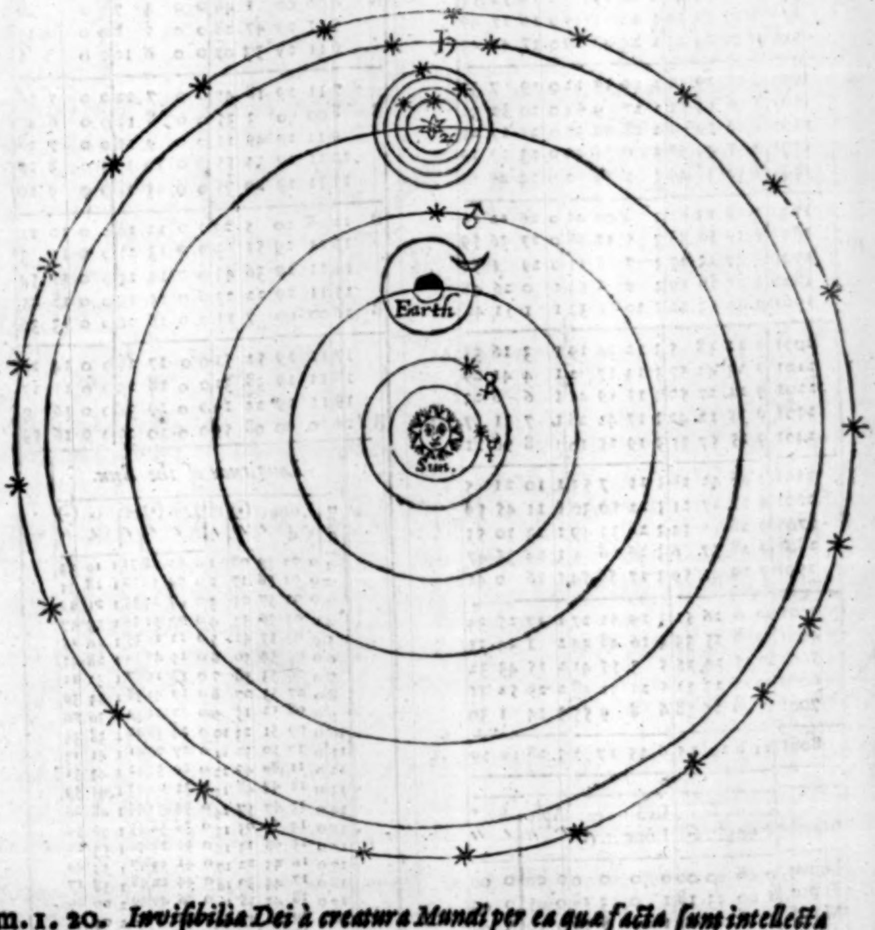
ENter this Table with the Suns place, finding the Signe on the Head, and the degree in the first Columne on the left Side, the Common Angle will shew the Æquation in Minutes and Seconds, which according to the Titles A or S, must be added or substracted to or from the equall time given, that it may be made apparent; But the Contrary Title must be applyed when the Apparent is to be converted into the equall.

Note yt on Mr Wings Ephemerides for 7 years beginning 1652 ending 1658 printed 1652 in Chapter 4 being ye introduction to ye Ephemerides this table is entitled A table of ye Aequation of naturall days yet no alteration of ye table nor its use

TABLES

TABLES
Of the Middle Motions and Æquations of SOL, LUNA, SATURN, JUPITER, MARS, VENUS, and MERCURY.

Veri Mundi Systematis Schema.



Rom. 1. 20. *Invisibilia Dei à creatura Mundi per ea quæ facta sunt intellecta conspiciuntur.*

LONDON:
Printed by ROBERT LEYBOURN, for the Company of STATIONERS, 1651.

A Table of the middle Motion of the Sun, and Fixed Stars, for Years of the Christian Æra, according to the Julian Account.

Years of Christ.	Longitude of ☉ s	d	′	″	Aphelion of ☉ s	d	′	″	Motion of Fixed ✳ s	d	′	″
001	9	8	00	31	2	8	20	3	0	4	58	38
101	9	8	45	24	2	10	2	46	0	6	23	32
201	9	9	30	16	2	11	45	29	0	7	48	26
301	9	10	15	09	2	13	28	12	0	9	13	20
401	9	11	00	1	2	15	10	54	0	10	38	13
501	9	11	44	54	2	16	53	37	0	12	3	7
601	9	12	29	47	2	18	36	20	0	13	28	1
701	9	13	14	40	2	20	19	3	0	14	52	55
801	9	13	59	32	2	22	1	46	0	16	17	49
901	9	14	44	25	2	23	44	29	0	17	42	43
1001	9	15	29	18	2	25	27	12	0	19	7	37
1101	9	16	14	11	2	27	9	54	0	20	32	31
1201	9	16	59	3	2	28	52	37	0	21	57	25
1301	9	17	43	56	3	0	35	20	0	23	22	19
1401	9	18	28	49	3	2	18	2	0	24	47	13
1501	9	19	13	41	3	4	00	45	0	26	12	6
1601	9	19	58	34	3	5	43	28	0	27	36	59
1701	9	20	43	27	3	7	26	11	0	29	1	54
1801	9	21	28	19	3	9	8	54	1	0	26	48
1901	9	22	13	12	3	10	51	37	1	1	51	42
2001	9	22	58	5	3	12	34	19	1	3	16	35
2101	9	23	42	57	3	14	17	2	1	4	41	29
2201	9	24	27	50	3	15	59	45	1	6	6	23
2301	9	25	12	43	3	17	42	28	1	7	31	17
2401	9	25	57	35	3	19	25	10	1	8	56	11
2501	9	26	42	28	3	21	7	53	1	10	21	5
2601	9	27	27	21	3	22	50	36	1	11	45	59
2701	9	28	12	14	3	24	33	19	1	13	10	53
2801	9	28	57	6	3	26	16	1	1	14	35	47
2901	9	29	41	59	3	27	58	54	1	16	0	41
3001	10	0	26	52	3	29	41	27	1	17	25	34
4001	10	8	25	39	4	16	48	44	2	1	34	33
5001	10	15	24	25	5	3	55	41	2	15	43	32
6001	10	22	23	12	5	21	2	48	2	29	52	31
7001	11	0	21	58	6	8	9	55	3	14	1	30
8001	11	8	20	45	6	25	17	2	3	28	10	29

Months	Com. Year. Longit. ☉				Leap-year Longit. ☉				Aph. ′	″	fix. ✳ ′	″
Januar.	0	00	00	00	0	0	0	0	0	00	0	00
Febru.	1	00	33	18	1	0	33	18	0	05	0	04
March	1	28	09	11	1	29	8	19	0	10	0	09
Aprill	2	28	42	30	2	29	41	38	0	15	0	13
May	3	28	16	39	3	29	15	48	0	20	0	18
June	4	28	49	58	4	29	49	2	0	25	0	22
July	5	28	24	7	5	29	23	15	0	31	0	26
August	6	28	57	25	6	29	56	34	0	36	0	29
Septēb	7	29	30	44	8	0	29	52	0	42	0	33
Octob.	8	29	4	54	9	0	4	2	0	47	0	38
Nove.	9	29	38	12	10	0	37	20	0	52	0	42
Decem.	10	29	12	22	11	0	11	30	0	57	0	46

A Table of the Annuall Motion of the Sun and Fixed Stars, for supplying the intermediate Years of the former Table.

	Years included.	Longitude of ☉ s	d	′	″	Aphel. of ☉ s	d	′	″	Motion of the fixed ✳ s	d	′	″
	80	00	00	35	54	0	1	22	10	0	1	7	55
	60	00	00	26	56	0	1	1	38	0	0	50	57
	40	00	00	17	57	0	0	41	5	0	0	33	58
	20	00	00	8	59	0	0	20	33	0	0	17	59
	1	11	29	45	40	0	0	1	2	0	0	0	51
	2	11	29	31	20	0	0	2	4	0	0	1	42
	3	11	29	16	59	0	0	3	5	0	0	2	33
B	4	00	00	1	48	0	0	4	7	0	0	3	24
	5	11	29	47	28	0	0	5	8	0	0	4	15
	6	11	29	33	07	0	0	6	10	0	0	5	5
	7	11	29	18	47	0	0	7	12	0	0	5	56
B	8	00	00	3	35	0	0	8	13	0	0	6	47
	9	11	29	49	15	0	0	9	15	0	0	7	38
	10	11	29	34	55	0	0	10	16	0	0	8	29
	11	11	29	20	35	0	0	11	18	0	0	9	20
B	12	00	00	5	23	0	0	12	20	0	0	10	11
	13	11	29	51	3	0	0	13	21	0	0	11	3
	14	11	29	36	43	0	0	14	23	0	0	11	54
	15	11	29	22	23	0	0	15	25	0	0	12	45
B	16	00	00	7	11	0	0	16	26	0	0	13	36
	17	11	29	52	51	0	0	17	28	0	0	14	26
	18	11	29	38	31	0	0	18	29	0	0	15	17
	19	11	29	24	10	0	0	19	3	0	0	16	8
B	20	00	00	08	59	0	0	20	33	0	0	16	59

Longitude of the Sun.

Dayes	Longi ☉ s	d	′	″	H	Lon ☉	′	″	H	Lon ☉ d	′	″
1	0	00	59	08	1	0	02	28	31	1	16	23
2	0	01	58	17	2	0	04	56	32	1	18	51
3	0	02	57	25	3	0	07	24	33	1	21	19
4	0	03	56	33	4	0	09	51	34	1	23	47
5	0	04	55	42	5	0	12	19	35	1	26	15
6	0	05	54	50	6	0	14	47	36	1	28	43
7	0	06	53	58	7	0	17	15	37	1	31	11
8	0	07	53	07	8	0	19	43	38	1	33	39
9	0	08	52	15	9	0	22	11	39	1	36	06
10	0	09	51	23	10	0	24	38	40	1	38	34
11	0	10	50	32	11	0	27	06	41	1	41	03
12	0	11	49	40	12	0	29	34	42	1	43	31
13	0	12	48	48	13	0	32	02	43	1	45	59
14	0	13	47	57	14	0	34	30	44	1	48	26
15	0	14	47	05	15	0	36	58	45	1	50	54
16	0	15	46	13	16	0	39	25	46	1	53	21
17	0	16	45	22	17	0	41	53	47	1	55	49
18	0	17	44	30	18	0	44	21	48	1	58	17
19	0	18	43	38	19	0	46	49	49	2	00	44
20	0	19	42	47	20	0	49	17	50	2	05	12
21	0	20	41	55	21	0	51	45	51	2	05	40
22	0	21	41	03	22	0	54	13	52	2	08	08
23	0	22	40	12	23	0	56	40	53	2	10	36
24	0	23	39	20	24	0	59	08	54	2	13	03
25	0	24	38	28	25	1	01	36	55	2	15	31
26	0	25	37	37	26	1	04	04	56	2	17	59
27	0	26	36	45	27	1	06	32	57	2	20	27
28	0	27	35	53	28	1	09	00	58	2	22	55
29	0	28	35	02	29	1	11	27	59	2	25	23
30	0	29	34	10	30	1	13	55	60	2	27	50
31	1	00	33	18								

A Table of the abſolute Æquation of the Sun.

Signe 0.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ☉ Subſtract. D	′	″	Diſtance of ☉ frõ Earth.
0	0	0	00	00	0	0	0	101803
1	0	0	58	54	0	2	7	101802
2	0	1	57	49	0	4	14	101801
3	0	2	56	44	0	6	20	10180
4	0	3	55	38	0	8	27	101799
5	0	4	54	33	0	10	32	101797
6	0	5	53	29	0	12	37	101794
7	0	6	52	24	0	14	42	101791
8	0	7	51	20	0	16	47	101786
9	0	8	50	15	0	18	52	101781
10	0	9	49	10	0	20	56	101776
11	0	10	48	06	0	23	0	101770
12	0	11	47	02	0	25	3	101763
13	0	12	45	59	0	27	5	101756
14	0	13	44	56	0	29	8	101748
15	0	14	43	53	0	31	10	101741
16	0	15	42	50	0	33	11	101732
17	0	16	41	47	0	35	12	101723
18	0	17	40	44	0	37	12	101714
19	0	18	39	41	0	39	11	101705
20	0	19	38	39	0	41	10	101695
21	0	20	37	37	0	43	8	101684
22	0	21	36	36	0	45	5	101673
23	0	22	35	37	0	47	1	101661
24	0	23	34	38	0	48	57	101648
25	0	24	32	39	0	50	52	101635
26	0	25	32	41	0	52	46	101622
27	0	26	31	43	0	54	39	101609
28	0	27	30	45	0	56	32	101594
29	0	28	29	47	0	58	23	10158[illegible]
30	0	29	28	50	1	0	14	101567
Anomal.					*Adde.*			

Signe 11.

Signe 1.

Anomalie co-æquated. S	D	′	″	Æquati. ☉ Subſtract. D	′	″	Diſtance of ☉ frõ Earth.	Degrees
0	29	28	50	1	0	14	101567	30
1	0	27	53	1	2	3	101549	29
1	1	26	56	1	3	51	101535	28
1	2	26	0	1	5	38	101520	27
1	3	25	5	1	7	24	101502	26
1	4	24	13	1	9	8	101483	25
1	5	23	25	1	10	51	101466	24
1	6	22	35	1	12	33	101449	23
1	7	21	45	1	14	14	101431	22
1	8	20	56	1	15	53	101411	21
1	9	20	7	1	17	31	101391	20
1	10	19	16	1	19	8	201371	19
1	11	18	25	1	20	43	101351	18
1	12	17	39	1	22	17	101331	17
1	13	16	53	1	23	50	101310	16
1	14	16	7	1	25	21	101287	15
1	15	15	22	1	26	51	101265	14
1	16	14	38	1	28	20	101243	13
1	17	13	53	1	29	47	101220	12
1	18	13	11	1	31	12	101199	11
1	19	12	30	1	32	36	101175	10
1	20	11	48	1	33	58	101150	9
1	21	11	8	1	35	19	101126	8
1	22	10	29	1	36	37	101102	7
1	23	9	50	1	37	54	101077	6
1	24	9	14	1	39	9	101052	5
1	25	8	39	1	40	23	101027	4
1	26	8	3	1	41	35	101000	3
1	27	7	29	1	42	45	100973	2
1	28	6	57	1	43	54	100948	1
1	29	6	24	1	45	0	100924	0
				Adde.				Anomal.

Signe 10.

A Table of the abſolute Æquation of the Sun.

Signe 2.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ☉ Subſtract. D	′	″	Diſtance of ☉ fró Earth.
0	1	29	6	24	1	45	0	100924
1	2	0	5	52	1	46	4	100897
2	2	1	5	21	1	47	7	100867
3	2	2	4	51	1	48	9	100839
4	2	3	4	24	1	49	9	100811
5	2	4	3	58	1	50	6	100782
6	2	5	3	32	1	51	2	100754
7	2	6	3	8	1	51	55	100725
8	2	7	2	46	1	52	46	100697
9	2	8	2	24	1	53	36	100668
10	2	9	2	3	1	54	24	100641
11	2	10	1	42	1	55	10	100613
12	2	11	1	21	1	55	53	100583
13	2	12	1	2	1	56	34	100554
14	2	13	0	44	1	56	13	100525
15	2	14	0	27	1	57	51	100494
16	2	15	0	13	1	58	26	100464
17	2	16	0	0	1	58	58	100434
18	2	16	59	46	1	59	29	100404
19	2	17	59	33	1	59	58	100373
20	2	18	59	21	2	0	25	100343
21	2	19	59	12	2	0	49	100312
22	2	20	59	4	2	1	12	100281
23	2	21	58	58	2	1	32	100249
24	2	22	58	52	2	1	50	100217
25	2	23	58	48	2	2	6	100186
26	2	24	58	45	2	2	19	100155
27	2	25	58	42	2	2	30	100123
28	2	26	58	41	2	2	40	100092
29	2	27	58	40	2	2	48	100061
30	2	28	58	39	2	2	53	100031
Anomal.	Adde.							

Signe 9.

Signe 3.

Anomalie co-æquated. S	D	′	″	Æquati. ☉ Subſtract. D	′	″	Diſtance of ☉ fró Earth.	Degrees
2	28	58	39	2	2	53	100031	30
2	29	58	42	2	2	55	100001	29
3	0	58	46	2	2	54	99970	28
3	1	58	49	2	2	52	99938	27
3	2	58	54	2	2	46	99906	26
3	3	59	0	2	2	39	99875	25
3	4	59	5	2	2	29	99845	24
3	5	59	11	2	2	17	99814	23
3	6	59	18	2	2	3	99782	22
3	7	59	31	2	1	46	99752	21
3	8	59	43	2	1	28	99721	20
3	9	59	56	2	1	8	99691	19
3	11	0	11	2	0	46	99660	18
3	12	0	27	2	0	20	99630	17
3	13	0	42	1	59	52	99600	16
3	14	0	58	1	59	23	99571	15
3	15	1	17	1	58	53	99540	14
3	16	1	37	1	58	20	99510	13
3	17	1	58	1	57	45	99480	12
3	18	2	21	1	57	6	99450	11
3	19	2	45	1	56	26	99421	10
3	20	3	8	1	55	45	99391	9
3	21	3	33	1	55	1	99362	8
3	22	3	56	1	54	14	99332	7
3	23	4	23	1	53	25	99303	6
3	24	4	49	1	52	33	99275	5
3	25	5	16	1	51	39	99246	4
3	26	5	46	1	50	43	99219	3
3	27	6	19	1	49	44	99191	2
3	28	7	49	1	48	44	99163	1
3	29	7	22	1	47	43	99135	0
Adde.								Anomal.

Signe 8.

A Table of the absolute Æquation of the Sun.

	Signe 4.								Signe 5.								
Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ☉ Substract. D	′	″	Distance of ☉ fró Earth.	Anomalie co-æquated. S	D	′	″	Æquati. ☉ Substract. D	′	″	Distance of ☉ fró Earth.	Degrees
0	3	29	7	22	1	47	43	99135	4	29	29	49	1	2	36	98472	30
1	4	0	7	56	1	46	40	99107	5	0	30	45	1	0	41	98457	29
2	4	1	8	30	1	45	34	99080	5	1	31	41	0	58	46	98441	28
3	5	2	9	5	1	44	26	99053	5	2	32	38	0	56	52	98426	27
4	4	3	9	42	1	43	17	99027	5	3	33	35	0	54	54	98412	26
5	4	4	10	18	1	42	5	99002	5	4	34	32	0	52	55	98398	25
6	4	5	10	55	1	40	50	98977	5	5	35	29	0	50	56	98385	24
7	4	6	11	35	1	39	34	98952	5	6	36	26	0	48	57	98372	23
8	4	7	12	14	1	38	16	98928	5	7	37	24	0	46	57	98361	22
9	4	8	12	54	1	36	56	98904	5	8	38	23	0	44	55	98350	21
10	4	9	13	36	1	35	35	98879	5	9	39	23	0	42	52	98338	20
11	4	10	14	17	1	34	13	98855	5	10	40	22	0	40	48	98327	19
12	4	11	14	59	1	32	49	98832	5	11	41	23	0	38	45	98317	18
13	4	12	15	44	1	31	22	98809	5	12	42	24	0	36	38	98308	17
14	4	13	16	28	1	29	53	98786	5	13	43	25	0	34	33	98299	16
15	4	14	17	13	1	28	22	98764	5	14	44	26	0	32	26	98290	15
16	4	15	17	59	1	26	50	98741	5	15	45	27	0	30	19	98282	14
17	4	16	18	44	1	25	16	98718	5	16	46	28	0	28	11	98275	13
18	4	17	19	31	1	23	40	98696	5	17	47	30	0	26	3	98269	12
19	4	18	20	20	1	22	3	98675	5	18	48	31	0	23	55	98263	11
20	4	19	21	9	1	20	25	98654	5	19	49	33	0	21	46	98256	10
21	4	20	21	57	1	18	45	98634	5	20	50	36	0	19	36	98251	9
22	4	21	22	46	1	17	4	98615	5	21	51	38	0	17	26	98246	8
23	4	22	23	34	1	15	21	98597	5	22	52	41	0	15	16	98243	7
24	4	23	24	23	1	13	36	98578	5	23	53	43	0	13	5	98240	6
25	4	24	25	12	1	11	49	98559	5	24	54	45	0	10	54	98237	5
26	4	25	26	4	1	10	1	98541	5	25	55	48	0	8	43	98235	4
27	4	26	26	59	1	8	12	98523	5	26	56	51	0	6	33	98233	3
28	4	27	27	55	1	6	21	98506	5	27	57	54	0	4	22	98231	2
29	4	28	28	51	1	4	29	98489	5	28	58	57	0	2	11	98230	1
30	4	29	29	49	1	2	36	98447	6	0	0	0	0	0	0	98229	0
Anomal.					Adde.								Adde.				Anomal.
	Signe 7.								Signe 6.								

A Table of the middle Motion of the Moon, for Years of the Christian Æra, according to the Julian Account.

Years of Christ.	Longitude of ☾ s	d	′	″	Aphelion of ☾ s	d	′	″	Node Ascen. ☾ s	d	′	″
001	4	02	34	49	9	10	14	55	8	28	32	53
101	2	10	23	29	0	29	32	46	4	14	21	46
201	0	18	12	09	4	18	50	37	0	00	10	39
301	10	26	00	49	8	08	08	28	7	15	59	33
401	9	03	49	29	11	27	26	19	3	01	48	26
501	7	11	38	09	3	16	44	10	10	17	37	19
601	5	19	26	49	7	06	02	01	6	03	26	12
701	3	27	15	29	10	25	19	52	1	19	15	05
801	2	05	04	09	2	14	37	42	9	05	03	58
901	0	12	52	49	6	03	55	33	4	20	52	52
1001	10	20	41	29	9	23	13	24	0	06	41	45
1101	8	28	30	09	1	12	31	15	7	22	30	38
1201	7	06	18	49	5	01	49	06	3	08	19	31
1301	5	14	07	29	8	21	06	57	10	24	08	25
1401	3	21	56	09	0	10	24	48	6	09	57	18
1501	1	29	44	49	3	29	42	39	1	25	46	11
1601	0	07	33	29	7	19	00	30	9	11	35	04
1701	10	15	22	09	11	08	18	21	4	27	23	57
1801	8	23	10	49	2	27	36	12	0	13	12	50
1901	7	00	59	29	6	16	54	03	7	29	01	43
2001	5	08	48	09	10	06	11	54	3	14	50	36
2101	3	16	36	49	1	25	29	45	11	00	39	30
2201	1	24	25	29	5	14	47	36	6	16	28	23
2301	0	2	14	09	9	04	05	27	2	02	17	16
2401	10	10	02	49	0	23	23	18	9	18	06	09
2501	8	17	51	29	4	12	41	09	5	03	55	02
2601	6	25	40	09	8	01	58	59	0	19	43	55
2701	5	03	28	49	11	21	16	50	8	05	32	48
2801	3	11	17	29	3	10	34	41	3	21	21	42
2901	1	19	06	09	6	29	52	32	11	07	10	35
3001	11	26	54	49	10	19	10	23	6	22	59	28
4001	6	15	01	29	11	02	08	37	10	01	08	21
5001	1	03	08	09	11	15	07	06	1	09	17	14
6001	7	21	14	49	11	28	05	35	3	17	26	07
7001	2	09	21	29	0	01	04	04	6	25	35	00
8001	8	27	28	09	0	14	02	33	10	03	43	53

Moneths of the Common Year.

Januar.	0	0	0	0	0	0	0	0	0	0	0	0
Febru.	1	18	28	6	0	3	27	13	0	1	38	30
March	1	27	24	26	0	6	34	23	0	3	7	28
Aprill	3	15	52	32	0	10	1	37	0	4	45	57
May	4	21	10	2	0	13	22	9	0	6	21	16
June	6	9	38	8	0	16	49	22	0	7	59	46
July	7	14	55	39	0	20	9	55	0	9	35	6
August	9	3	23	44	0	23	37	8	0	11	13	35
Septemb	10	21	51	50	0	27	4	21	0	12	52	5
Octob.	11	27	9	21	1	0	24	53	0	14	27	24
Nove.	1	15	37	26	1	3	52	7	0	16	5	54
Decem	2	20	54	57	1	7	12	39	0	17	41	13

In the Bissextile Year, after February compleat, adde the motion of one day to the Sum; as in March in the Common Year, the middle Longitude of ☾ is 1s 27d 24′ 26″, but in the Bissextile (by adding the Diurnall motion 13d 10′ 35″) it is 2s 10d 35′ 1″.

A Table of the middle Motion of the Moon for supplying the intermediate Years of the former Table.

	Years included.	Longitude of ☾ s	d	′	″	Aphel. of ☾ s	d	′	″	Node Ascen. ☾ s	d	′	″
	80	5	24	14	56	0	15	26	16	3	17	20	54
	60	1	10	41	12	9	11	34	42	2	20	30	40
	40	8	27	07	28	6	07	43	8	1	23	40	27
	20	4	13	33	44	3	03	51	34	0	26	50	13
	1	4	09	23	03	1	10	39	54	0	19	19	43
	2	8	18	46	05	2	21	19	49	1	08	39	26
	3	0	28	09	07	4	01	59	43	1	27	59	09
B	4	5	20	42	45	5	12	46	20	2	17	22	03
	5	10	00	05	47	6	23	26	14	3	06	41	46
	6	2	09	28	49	8	04	06	08	3	26	01	29
	7	6	18	51	52	9	14	46	3	4	15	21	12
B	8	11	11	25	29	10	25	32	39	5	04	44	05
	9	3	20	48	31	0	06	12	32	5	24	03	48
	10	8	00	11	34	1	16	52	27	6	13	23	32
	11	0	09	34	36	2	27	32	21	7	02	43	15
B	12	5	02	08	14	4	08	18	57	7	22	06	08
	13	9	11	31	16	5	18	58	51	8	11	25	51
	14	1	20	54	18	6	29	38	45	9	00	45	34
	15	6	00	17	21	8	10	18	40	9	20	05	17
B	16	10	22	50	58	9	21	05	16	10	09	28	11
	17	3	02	14	02	11	01	45	10	10	28	47	54
	18	7	11	37	04	0	12	25	04	11	18	07	37
	19	11	21	00	06	1	23	04	57	0	07	27	20
B	20	4	13	33	44	3	03	51	34	0	26	50	13

Days	Longitude ☾ s	d	′	″	Aph. ☾ d	′	″	Node ☾ d	′	″
1	0	13	10	35	0	6	41	0	3	11
2	0	26	21	10	0	13	22	0	6	21
3	1	09	31	45	0	20	3	0	9	32
4	1	22	42	20	0	26	44	0	12	43
5	2	05	52	55	0	33	25	0	15	53
6	2	19	03	30	0	40	6	0	19	4
7	3	02	14	05	0	46	48	0	22	14
8	3	15	24	40	0	53	29	0	25	25
9	3	28	35	15	1	0	10	0	28	36
10	4	11	45	50	1	6	51	0	31	46
11	4	24	56	25	1	13	32	0	34	57
12	5	08	07	00	1	20	13	0	38	8
13	5	21	17	35	1	26	54	0	41	18
14	6	04	28	10	1	33	35	0	44	28
15	6	17	38	45	1	40	6	0	47	40
16	7	00	49	20	1	46	57	0	50	50
17	7	13	59	55	1	53	38	0	54	1
18	7	27	10	30	2	0	19	0	57	11
19	8	10	21	05	2	7	0	1	0	22
20	8	23	31	40	2	13	41	1	3	33
21	9	06	42	15	2	20	23	1	6	43
22	9	19	52	50	2	27	4	1	9	54
23	10	03	03	25	2	33	45	1	13	5
24	10	16	14	00	2	40	26	1	16	15
25	10	29	24	36	2	47	7	1	19	26
26	11	12	35	11	2	53	48	1	22	37
27	11	25	45	46	3	0	29	1	25	47
28	0	08	56	21	3	7	10	1	82	58
29	0	22	06	56	3	13	51	1	32	09
30	1	05	17	31	3	20	32	1	35	19
31	1	18	28	06	3	27	13	1	38	30

Hours	Lon. ☾ d	′	″	Ap. ☾ ′	″	No. ☾ ′	″
1	0	32	56	0	7	0	8
2	1	5	53	0	33	0	16
3	1	38	49	0	50	0	24
4	2	11	49	1	7	0	32
5	2	44	46	1	24	0	40
6	3	17	39	1	40	0	48
7	3	50	35	1	57	0	56
8	4	23	32	2	14	1	4
9	4	56	28	2	30	1	12
10	5	29	25	2	57	1	19
11	6	2	21	3	4	1	27
12	6	35	18	3	21	1	35
13	7	8	14	3	27	1	43
14	7	41	10	3	54	1	51
15	8	14	7	4	11	1	59
16	8	47	3	4	27	2	7
17	9	20	0	4	44	2	15
18	9	52	56	5	0	2	23
19	10	25	53	5	18	2	31
20	10	58	49	5	34	2	39
21	11	31	46	5	51	2	47
22	12	4	42	6	8	2	55
23	12	37	39	6	24	3	3
24	13	10	35	6	41	3	11
25	13	43	32	6	58	3	19
26	14	16	28	7	15	3	27
27	14	49	24	7	31	3	34
28	15	20	21	7	48	3	42
29	15	55	17	8	5	3	50
30	16	28	14	8	22	3	58

A Table of the absolute Æquation of the first inequality of the Moon.

Signe 0.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ☾ Substract. D	′	″	Distance of ☾ fró Earth.
0	0	0	0	0	0	0	0	4225
1	0	0	57	23	0	5	3	4225
2	0	1	54	41	0	9	59	4225
3	0	2	52	1	0	14	56	4225
4	0	3	49	21	0	19	55	4225
5	0	4	46	42	0	24	54	4224
6	0	5	44	3	0	29	53	4224
7	0	6	41	24	0	34	52	4224
8	0	7	38	46	0	39	50	4223
9	0	8	36	7	0	44	47	4223
10	0	9	33	31	0	49	43	4223
11	0	10	30	54	0	54	37	4222
12	0	11	28	17	0	59	29	4222
13	0	12	25	41	1	4	20	4221
14	0	13	23	5	1	9	11	4220
15	0	14	20	30	1	14	1	4220
16	0	15	17	55	1	18	50	4219
17	0	16	15	21	1	23	38	4218
18	0	17	12	48	1	28	25	4217
19	0	18	10	17	1	33	10	4216
20	0	19	7	46	1	37	53	4215
21	0	20	5	16	1	42	32	4214
22	0	21	2	48	1	47	7	4213
23	0	22	0	21	1	51	41	4212
24	0	22	57	56	1	56	14	4211
25	0	23	55	32	2	0	45	4210
26	0	24	53	9	2	5	14	4209
27	0	25	50	48	2	9	41	4207
28	0	26	48	28	2	14	9	4206
29	0	27	46	9	2	18	35	4205
30	0	28	43	49	2	23	0	4204
Anomal.	*Adde.*							

Signe 11.

Signe 1.

Anomalie co-æquated. S	D	′	″	Æquati. ☾ Substract. D	′	″	Distance of ☾ fró Earth.	Degrees
0	28	43	49	2	23	0	4204	30
0	29	41	31	2	27	24	4202	29
1	0	39	15	2	31	45	4201	28
1	1	37	2	2	36	3	4199	27
1	2	34	50	2	40	16	4198	26
1	3	32	40	2	44	26	4196	25
1	4	30	31	2	48	35	4194	24
1	5	28	25	2	52	42	4192	23
1	6	26	21	2	56	45	4191	22
1	7	24	18	3	0	44	4189	21
1	8	22	17	3	4	39	4187	20
1	9	20	16	3	8	33	4185	19
1	10	18	17	3	12	25	4183	18
1	11	16	20	3	16	14	4181	17
1	12	14	25	3	20	0	4179	16
1	13	12	32	3	23	42	4277	15
1	14	10	42	3	27	20	4174	14
1	15	8	54	3	30	53	4171	13
1	16	7	10	3	34	23	4169	12
1	17	5	27	3	37	50	4167	11
1	18	3	47	3	41	13	4164	10
1	19	2	8	3	44	32	4162	9
1	20	0	33	3	47	49	4160	8
1	20	58	58	3	51	2	4157	7
1	21	57	25	3	54	9	4155	6
1	22	55	53	3	57	14	4154	5
1	23	54	25	4	0	15	4152	4
1	24	53	0	4	3	13	4150	3
1	25	51	36	4	6	6	4148	2
1	26	50	16	4	8	56	4145	1
1	27	48	58	4	11	44	4143	0
Adde.								Anomal.

Signe 10.

A Table of the absolute Æquation of the first inequality of the Moon.

Signe 2.

Degrees	Anomalie co-æquated. S	D	'	"	Æquati. ☾ Substract. D	'	"	Distance of ☾ frõ Earth.
0	1	27	48	58	4	11	44	4143
1	1	28	47	43	4	14	27	4141
2	1	29	46	30	4	17	2	4138
3	2	0	45	18	4	18	30	4135
4	2	1	44	12	4	21	56	4133
5	2	2	43	6	4	24	20	4130
6	2	3	42	3	4	26	41	4127
7	2	4	41	1	4	28	57	4125
8	2	5	40	5	4	30	11	4122
9	2	6	39	10	4	33	18	4119
10	2	7	38	16	4	35	20	4116
11	2	8	37	25	4	37	19	4113
12	2	9	36	38	4	39	8	4110
13	2	10	35	55	4	41	0	4107
14	2	11	35	15	4	42	50	4104
15	2	12	34	35	4	44	41	4101
16	2	13	34	11	4	46	5	4098
17	2	14	33	28	4	47	29	4096
18	2	15	32	53	4	48	47	4093
19	2	16	32	27	4	50	3	4090
20	2	17	32	1	4	51	17	4087
21	2	18	31	38	4	52	28	4084
22	2	19	31	17	4	53	33	4081
23	2	20	31	0	4	54	30	4078
24	2	21	30	46	4	55	22	4075
25	2	22	30	34	4	56	9	4072
26	2	23	30	25	4	56	51	4069
27	2	24	30	19	4	57	27	4066
28	2	25	30	16	4	57	58	4063
29	2	26	30	17	4	58	25	4060
30	2	27	30	18	4	58	42	4057
Anomal.					Adde.			

Signe 9.

Signe 3.

Anomalie co-æquated. S	D	'	"	Æquati. ☾ Substract. D	'	"	Distance of ☾ frõ Earth.	Degrees
2	27	30	18	4	58	42	4057	30
2	28	30	24	4	58	53	4053	29
2	29	30	31	4	58	59	4050	28
3	0	30	41	4	58	58	4047	27
3	1	30	55	4	58	50	4044	26
3	2	31	10	4	58	36	4041	25
3	3	31	29	4	58	17	4038	24
3	4	31	50	4	57	56	4035	23
3	5	32	14	4	57	31	4032	22
3	6	32	40	4	57	2	4029	21
3	7	33	9	4	56	28	4026	20
3	8	33	41	4	55	45	4023	19
3	9	34	16	4	54	52	4020	18
3	10	34	55	4	53	54	4017	17
3	11	35	45	4	52	54	4014	16
3	12	36	16	4	51	51	4010	15
3	13	37	0	4	50	45	4007	14
3	14	37	46	4	49	36	4004	13
3	15	38	35	4	48	21	4001	12
3	16	39	27	4	47	2	3998	11
3	17	40	24	4	45	37	3995	10
3	18	41	23	4	44	4	3992	9
3	19	42	23	4	42	25	3989	8
3	20	43	24	4	40	38	3986	7
3	21	44	32	4	38	47	3983	6
3	22	45	40	4	36	50	3980	5
3	23	46	50	4	34	46	3977	4
3	24	48	2	4	32	39	3975	3
3	25	49	17	4	30	26	2972	2
3	26	50	34	4	28	6	3969	1
3	27	51	53	4	25	39	3966	0
				Adde.				Anomal.

Signe 8.

A Table of the absolute Æquation of the first inequality of the Moon.

Signe 4.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ☾ Substract D	′	″	Dist. ☾ frõ Earth
0	3	27	51	53	4	25	39	3966
1	3	28	53	14	4	23	7	3963
2	3	29	54	37	4	20	28	3960
3	4	0	56	4	4	17	52	3958
4	4	1	57	34	4	15	6	3955
5	4	2	59	5	4	12	14	3953
6	4	4	0	38	4	9	18	3950
7	4	5	2	13	4	6	18	3948
8	4	6	3	50	4	3	13	3945
9	4	7	5	27	4	0	3	3943
10	4	8	7	7	3	56	47	3940
11	4	9	8	49	3	53	24	3938
12	4	10	10	33	3	49	56	3935
13	4	11	12	19	3	46	24	3933
14	4	12	14	8	3	42	48	3930
15	4	13	15	58	3	39	6	3928
16	4	14	17	50	3	35	20	3926
17	4	15	19	44	3	31	28	3924
18	4	16	21	41	3	27	32	3922
19	4	17	23	40	3	23	33	3920
20	4	18	25	37	3	19	31	3918
21	4	19	27	36	3	15	26	3916
22	4	20	29	37	3	11	17	3914
23	4	21	31	39	3	7	4	3912
24	4	22	33	43	3	2	49	3910
25	4	23	35	51	2	58	32	3908
26	4	24	37	58	2	54	11	3906
27	4	25	40	8	2	49	47	3904
28	4	26	42	19	2	45	18	3902
29	4	27	44	31	2	40	42	3900
30	4	28	46	45	2	36	2	3899
Anomal.					Adde.			

Signe 7.

Signe 5.

Anomalie co-æquated. S	D	′	″	Æquati. ☾ Substract D	′	″	Dist. ☾ frõ Earth	Degrees
4	28	46	45	2	36	2	3899	30
4	29	49	1	2	31	18	3897	29
5	0	51	16	2	26	31	3895	28
5	1	53	32	2	21	41	3898	27
5	2	55	50	2	16	52	3893	26
5	3	58	8	2	11	58	3891	25
5	5	0	28	2	7	2	3890	24
3	6	2	48	2	2	3	3889	23
5	7	5	11	1	57	1	3887	22
5	8	7	34	1	51	57	3886	21
5	9	9	58	1	46	51	3885	20
5	10	12	22	1	41	44	3884	19
5	11	14	48	1	36	34	3883	18
5	12	17	15	1	31	22	2882	17
5	13	19	42	1	26	8	3881	16
5	14	22	11	1	20	52	3880	15
5	15	24	41	1	15	34	3879	14
5	16	27	10	1	10	14	3878	13
5	17	29	39	1	4	53	3877	12
5	18	32	10	0	59	31	3876	11
5	19	34	40	0	54	8	3876	10
5	20	37	10	0	48	46	3875	9
5	21	39	4	0	43	23	3875	8
5	22	42	13	0	38	0	3874	7
5	23	44	45	0	32	36	3874	6
5	24	47	17	0	27	11	3874	5
5	25	49	49	0	21	46	3873	4
5	26	52	22	0	16	21	3873	3
5	27	54	54	0	10	55	3873	2
5	28	57	27	0	5	28	3873	1
6	0	0	0	0	0	0	3873	0
				Adde.				Anoma.

Signe 6.

A Table of the Reflection and Variation of the Moons Æquation.

Anomalie ☾ co-æquated.		True Distance of ☾ from ⊙, or from her ☍ to □										Anomalie ☾ co-æquated.	
		S 0	0	0	0	0	0	0	0	0	1		
		D 3	6	9	12	15	18	21	24	27	0		
		Sub.	Sub.	Subs.	Sub.	Sub.	Sub.	Sub.	Sub.	Sub.	Sub		
S	D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	S	D
0	00	0 3	0 7	0 10	0 13	0 16	0 19	0 21	0 23	0 25	0 27	12	00
	06	0 3	0 7	0 10	0 13	0 17	0 20	0 23	0 26	0 28	0 31		24
	12	0 3	0 7	0 10	0 14	0 17	0 21	0 24	0 28	0 31	0 34		18
	18	0 3	0 6	0 10	0 14	0 17	0 21	0 25	0 29	0 32	0 36		12
	24	0 3	0 6	0 9	0 13	0 17	0 21	0 25	0 29	0 33	0 37		6
1	00	0 3	0 5	0 9	0 12	0 16	0 20	0 25	0 29	0 33	0 38	11	00
	6	0 2	0 5	0 8	0 11	0 15	0 19	0 24	0 28	0 33	0 38		24
	12	0 2	0 4	0 7	0 10	0 13	0 18	0 22	0 27	0 32	0 37		18
	18	0 1	0 3	0 5	0 8	0 12	0 16	0 20	0 25	0 30	0 35		12
	24	0 1	0 2	0 4	0 6	0 9	0 13	0 17	0 22	0 27	0 33		6
2	00	0A0	0 1	0 2	0 4	0 7	0 10	0 14	0 19	0 24	0 29	10	00
	6	0 1	0A1	0A0	0 2	0 4	0 7	0 11	0 15	0 20	0 25		24
	12	0 1	0 2	0 2	0A1	0 1	0 3	0 7	0 11	0 15	0 21		18
	18	0 2	0 3	0 4	0 4	0A2	0A1	0 2	0 6	0 10	0 15		12
	24	0 3	0 5	0 6	0 7	0 6	0 5	0A3	0 1	0 ~~10~~ 1	0 10		6
3	00	0 4	0 7	0 9	0 10	0 10	0 9	0 8	0A5	0A1	0 3	9	00
	6	0 5	0 8	0 11	0 13	0 14	0 14	0 13	0 11	0 8	0A4		24
	12	0 5	0 10	0 14	0 16	0 18	0 19	0 18	0 17	0 15	0 11		18
	18	0 6	0 12	0 16	0 20	0 22	0 24	0 24	0 24	0 22	0 19		12
	24	0 7	0 13	0 19	0 23	0 26	0 29	0 30	0 30	0 29	0 27		6
4	00	0 8	0 15	0 21	0 26	0 30	0 34	0 36	0 37	0 36	0 35	8	00
	6	0 8	0 16	0 23	0 29	0 34	0 38	0 41	0 43	0 44	0 43		24
	12	0 9	0 18	0 25	0 32	0 38	0 43	0 47	0 50	0 51	0 51		18
	18	0 10	0 19	0 27	0 35	0 42	0 48	0 52	0 56	0 58	0 59		12
	24	0 10	0 20	0 29	0 38	0 45	0 52	0 57	1 2	1 5	1 7		6
5	00	0 11	0 21	0 31	0 40	0 48	0 56	1 2	1 7	1 11	1 14	7	00
	6	0 11	0 22	0 33	0 42	0 51	0 59	1 6	1 12	1 17	1 21		24
	12	0 12	0 23	0 34	0 44	0 54	1 2	1 10	1 17	1 23	1 27		18
	18	0 12	0 24	0 35	0 46	0 56	1 5	1 14	1 21	1 28	1 33		12
	24	0 12	0 24	0 36	0 47	0 57	1 7	1 17	1 25	1 32	1 38		6
6	00	0 12	0 24	0 36	0 48	0 59	1 9	1 19	1 28	1 36	1 42	6	00
		Subs.	Subs.	Subs.	Sub.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.		
From ☌ or ☍ to □.		D 27	24	21	18	15	12	9	6	3	0	From □ to ☌ or ☍	
		S 5	5	5	5	5	5	5	5	5	5		
		True Distance of ☾ from ⊙ from □ to ☌ or ☍.											

Above the Scale Ascending, and below the Scale Descending, is to be added, as A demonstrates.

A Table of the Reflection and Variation of the Moons Æquation.

Anomalie ☾ co-æquated.	True Distance of ☾ from ☉, or from her ☍ to □.										Anomalie ☾ co-æquated.
	S 0	0	0	0	0	0	0	0	0	1	
	D 3	6	9	12	15	18	21	24	27	0	
	Add	Add	Aad	Ada	Add	Add	Add	Ada	Add	Add	
S D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	S D
6 00	0 12	0 24	0 36	0 48	0 59	1 9	1 19	1 28	1 36	1 42	6 00
06	0 12	0 24	0 36	0 48	1 0	1 10	1 20	1 30	1 38	1 46	24
12	0 12	0 24	0 36	0 48	1 0	1 11	1 22	1 32	1 40	1 49	18
18	0 12	0 24	0 36	0 48	1 0	1 11	1 22	1 32	1 42	1 51	12
24	0 12	0 24	0 36	0 48	0 59	1 11	1 22	1 33	1 42	1 52	6
7 00	0 11	0 23	0 35	0 47	0 58	0 10	1 21	1 32	1 42	1 52	5 00
6	0 11	0 22	0 34	0 45	0 57	0 9	1 20	1 31	1 41	1 51	24
12	0 10	0 21	0 32	0 44	0 55	0 7	1 18	1 29	1 39	1 49	18
18	0 10	0 20	0 31	0 42	0 53	0 4	1 15	1 26	1 37	1 47	12
24	0 9	0 19	0 29	0 40	0 50	0 1	1 12	1 23	1 34	1 44	6
8 00	0 8	0 18	0 27	0 37	0 47	0 58	1 9	1 19	1 30	1 40	4 00
6	0 8	0 16	0 25	0 35	0 44	0 55	1 5	1 15	1 25	1 35	24
12	0 7	0 15	0 23	0 32	0 41	0 51	1 1	1 11	1 20	1 30	18
18	0 6	0 13	0 21	0 29	0 38	0 47	0 56	1 6	1 14	1 24	12
24	0 5	0 12	0 18	0 26	0 34	0 42	0 51	1 0	1 9	1 18	6
9 00	0 4	0 10	0 16	0 23	0 30	0 38	0 46	0 54	1 3	1 12	3 00
6	0 4	0 8	0 14	0 20	0 26	0 33	0 41	0 48	0 57	1 4	24
12	0 3	0 7	0 11	0 16	0 22	0 29	0 35	0 42	0 50	0 58	18
18	0 2	0 5	0 9	0 13	0 18	0 24	0 30	0 36	0 43	0 50	12
24	0 1	0 4	0 6	0 10	0 14	0 19	0 24	0 30	0 36	0 43	6
10 00	0 1	0 2	0 4	0 7	0 10	0 14	0 19	0 24	0 29	0 35	2 00
6	0 1	0 1	0 2	0 4	0 7	0 10	0 14	0 18	0 23	0 28	24
12	0 S 0	0 S 0	0 S 0	0 1	0 3	0 6	0 9	0 12	0 16	0 20	18
18	0 1	0 2	0 2	0 S 1	0 S 0	0 1	0 4	0 6	0 9	0 13	12
24	0 2	0 3	0 3	0 4	0 3	0 S 2	0 S 1	0 1	0 3	0 6	6
11 00	0 2	0 4	0 5	0 6	0 6	0 6	0 5	0 S 4	0 S 3	0 S 1	1 00
6	0 2	0 5	0 6	0 8	0 9	0 9	0 9	0 9	0 8	0 7	24
12	0 3	0 5	0 8	0 9	0 11	0 12	0 13	0 13	0 13	0 13	18
18	0 3	0 6	0 9	0 11	0 13	0 15	0 16	0 17	0 18	0 18	12
24	0 3	0 6	0 9	0 12	0 15	0 17	0 16	0 21	0 22	0 23	6
12 00	0 3	0 7	0 10	0 13	0 16	0 19	0 21	0 23	0 25	0 26	0 00
	Adde	Adde	Adde	Adae	Addr	Adde	Adde	Adde	Adde	Adde	
From ☌ or ☍ to □.	D 27	24	21	18	15	12	9	6	3	0	From □ to ☌ or ☍.
	S 5	5	5	5	5	5	5	5	5	5	
	True Distance of ☾ from ☉ from □ to ☌ or ☍.										

Above the Scale Ascending, and below the Scale Descending, is to be substracted, as S demonstrates.

A Table of the Reflection and Variation of the Moons Æquation.

True Distance of ☾ from ☉, or from her ☍ to □.

Anomalie ☾ co-æquated.		S 1 D 0	1 3	1 6	1 9	1 12	1 15	1 18	1 21	1 24	1 27	2 0	Anomalie ☾ co-æquated	
		Sub.	Sub.	Sub.	Sub.	Sub.	Snb.	Sub.	Sub.	Sub.	Sub.	Sub.		
S	D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	S	D
0	00	0 27	0 29	0 30	0 30	0 31	0 31	0 30	0 30	0 29	0 27	0 26	12	00
	06	0 31	0 33	0 35	0 36	0 37	0 38	0 38	0 38	0 38	0 37	0 37		24
	12	0 34	0 36	0 39	0 41	0 43	0 44	0 46	0 46	0 47	0 47	0 47		18
	18	0 36	0 39	0 42	0 45	0 48	0 50	0 52	0 54	0 55	0 56	0 56		12
	24	0 37	0 41	0 45	0 48	0 52	0 55	0 57	1 1	1 2	1 4	1 5		6
1	00	0 38	0 42	0 47	0 5[illegible]	0 55	0 58	1 2	1 5	1 8	1 10	1 12	11	00
	6	0 38	0 42	0 47	0 52	0 57	1 1	1 5	1 9	1 13	1 16	1 19		24
	12	0 37	0 42	0 47	0 52	0 58	1 3	1 7	1 12	1 16	1 20	1 24		18
	18	0 35	0 40	0 46	0 52	0 57	1 3	1 9	1 14	1 19	1 24	1 28		12
	24	0 33	0 38	0 44	0 50	0 56	1 3	1 9	1 14	1 20	1 26	1 31		6
2	00	0 29	0 35	0 41	0 48	0 54	1 1	1 7	1 14	1 20	1 26	1 32	10	00
	6	0 25	0 31	0 38	0 44	0 51	0 58	1 5	1 12	1 19	1 26	1 32		24
	12	0 21	0 27	0 33	0 40	0 47	0 54	1 0	1 9	1 17	1 24	1 31		18
	18	0 15	0 21	0 27	0 34	0 41	0 49	0 56	1 5	1 13	1 21	1 29		12
	24	0 10	0 15	0 21	0 28	0 35	0 43	0 51	0 59	1 7	1 16	1 24		6
3	00	0 A3	0 8	0 14	0 21	0 28	0 36	0 44	0 52	1 1	1 10	1 19	9	00
	6	0 4	0 1	0 6	0 13	0 20	0 28	0 36	0 44	0 54	1 3	1 12		24
	12	0 11	0 A7	0 A2	0 4	0 11	0 19	0 27	0 36	0 45	0 55	1 4		18
	18	0 19	0 15	0 10	0 A5	0 2	0 9	0 17	0 26	0 35	0 45	0 55		12
	24	0 27	0 24	0 20	0 14	0 A8	0 A1	0 7	0 15	0 25	0 34	0 44		6
4	00	0 35	0 33	0 29	0 24	0 19	0 12	0 A4	0 4	0 13	0 23	0 33	8	00
	6	0 43	0 41	0 38	0 34	0 29	0 23	0 16	0 A8	0 1	0 11	0 20		24
	12	0 51	0 50	0 48	0 45	0 40	0 35	0 28	0 21	A12	0 A3	0 7		18
	18	0 59	0 59	0 58	0 55	0 51	0 46	0 40	0 33	0 15	0 11	0 A7		12
	24	1 7	1 8	1 7	1 5	1 2	0 58	0 53	0 46	0 38	0 3[illegible]	0 21		6
5	00	1 14	1 16	1 16	1 15	1 13	1 9	1 5	0 59	0 52	0 44	0 35	7	00
	6	1 21	1 24	1 24	1 25	1 23	1 21	1 17	1 12	1 5	0 58	0 50		24
	12	1 27	1 31	1 32	1 34	1 33	1 31	1 28	1 24	1 18	1 12	1 4		18
	18	1 33	1 37	1 39	1 43	1 42	1 41	1 39	1 36	1 31	1 25	1 18		12
	24	1 38	1 43	1 45	1 49	1 50	1 51	1 49	1 47	1 43	1 37	1 31		6
6	00	1 42	1 48	1 51	1 56	1 58	1 59	1 59	1 57	1 54	1 50	1 44	6	00
From ☌ or ☍ to □.		Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	From □ to ☌ or ☍.	
		D 0	27	24	21	18	15	12	9	6	3	0		
		S 5	4	4	4	4	4	4	4	4	4	4		

True Distance of ☾ from ☉ from □ to ☌ or ☍.

A Table of the Reflection and Variation of the Moons Æquation.

Anomalie ☾ co-æquated.	True Distance of ☾ from ☉, or from her ☍ to □.											Anomalie ☾ co-æquated.
	S 1	1	1	1	1	1	1	1	1	1	2	
	D 0	3	6	9	12	15	18	21	24	27	0	
	Add.	Add	Add	Add	Add	Add	Add	Add	Add	Add	Add	
S D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	S D
6 00	1 42	1 48	1 53	1 56	1 58	1 59	1 59	1 57	1 54	1 50	1 44	6 00
06	1 46	1 53	1 58	2 2	2 5	2 7	2 7	2 6	2 4	2 1	1 56	24
12	1 49	1 56	2 2	2 7	2 11	2 13	2 15	2 14	2 13	2 11	2 7	18
18	1 51	1 58	2 5	2 11	2 15	2 19	2 21	2 22	2 21	2 20	2 17	12
24	1 52	2 0	2 7	2 14	2 19	2 23	2 26	2 28	2 28	2 27	2 25	6
7 00	1 52	2 0	2 8	2 15	2 21	2 26	2 30	2 32	2 34	2 33	2 32	5 00
6	1 51	2 0	2 8	2 16	2 22	2 28	2 32	2 35	2 38	2 38	2 38	24
12	1 49	1 59	2 7	2 15	2 22	2 28	2 33	2 37	2 40	2 42	2 42	18
18	1 47	1 57	2 6	2 14	2 21	2 28	2 33	2 38	2 41	2 44	2 45	12
24	1 44	1 54	2 3	2 11	2 19	2 26	2 32	2 37	2 41	2 44	2 46	6
8 00	1 40	1 50	1 59	2 8	2 16	2 23	2 30	2 35	2 40	2 44	2 46	4 00
6	1 35	1 45	1 54	2 3	2 12	2 19	2 26	2 32	2 37	2 42	2 45	24
12	1 30	1 40	1 49	1 58	2 6	2 14	2 21	2 28	2 33	2 38	2 42	18
18	1 24	1 34	1 43	1 52	2 0	2 8	2 15	2 22	2 28	2 33	2 37	12
24	1 18	1 27	1 36	1 45	1 53	2 1	2 9	2 16	2 22	2 27	2 32	6
9 00	1 12	1 20	1 29	1 38	1 46	1 54	2 1	2 8	2 14	2 20	2 25	3 00
6	1 5	1 13	1 21	1 29	1 37	1 45	1 53	2 0	2 6	2 12	2 17	24
12	0 58	1 5	1 13	1 21	1 29	1 36	1 43	1 51	1 57	2 3	2 8	18
18	0 50	0 57	1 5	1 12	1 20	1 27	1 34	1 41	1 47	1 53	1 58	12
24	0 43	0 49	0 56	1 3	1 10	1 17	1 24	1 30	1 36	1 42	1 48	6
10 00	0 35	0 41	0 47	0 54	1 0	1 7	1 13	1 19	1 25	1 31	1 37	2 00
6	0 28	0 33	0 38	0 44	0 50	0 56	1 2	1 8	1 14	1 20	1 25	24
12	0 20	0 25	0 30	0 35	0 40	0 46	0 51	0 57	1 2	1 8	1 13	18
18	0 13	0 17	0 21	0 26	0 30	0 35	0 40	0 45	0 50	0 56	1 0	12
24	0 6	0 9	0 13	0 16	0 21	0 25	0 29	0 34	0 38	0 43	0 48	6
11 00	0 S1	0 2	0 4	0 8	0 11	0 15	0 18	0 22	0 27	0 31	0 35	1 00
6	0 7	0 S5	0 S3	0 S1	0 2	0 5	0 8	0 11	0 15	0 19	0 22	24
12	0 13	0 12	0 11	0 9	0 S8	0 S5	0 S2	0 S0	0 3	0 7	0 10	18
18	0 18	0 18	0 18	0 17	0 16	0 14	0 12	0 10	0 S8	0 S5	0 S3	12
24	0 23	0 24	0 24	0 24	0 23	0 23	0 22	0 20	0 19	0 17	0 14	6
12 00	0 26	0 29	0 30	0 30	0 31	0 31	0 30	0 30	0 28	0 27	0 26	0 00
From ☌ or ☍ to □.	Adde	Adde	Adde	Adde	Adde	Adde	Adde	Adde	Adde	Adde	Adde	From □ to ☌ or ☍.
	D 0	27	24	21	18	15	12	9	6	3	0	
	S 5	4	4	4	4	4	4	4	4	4	4	
	True Distance of ☾ from ☉, from □ to ☌ or ☍.											

A Table of the Reflection and Variation of the Moons Æquation.

Anomalie ☾ co-æquated S	D	True Distance of ☾ from ☉, or from her ☍ to □. S 2 D 0 Sub.	2 3 Sub.	2 6 Sub.	2 9 Sub.	2 12 Sub.	2 15 Subs.	2 18 Sub.	2 21 Sub.	2 24 Sub.	2 27 Sub.	3 0 Sub.	Anomalie ☾ co-æquated. S	D
		D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′		
0	00	0 26	0 24	0 22	0 20	0 17	0 15	0 12	0 9	0 6	0 3	0 0	12	00
	06	0 37	0 36	0 34	0 32	0 30	0 28	0 26	0 23	0 20	0 18	0 15		24
	12	0 47	0 46	0 46	0 44	0 43	0 41	0 39	0 37	0 34	0 32	0 29		18
	18	0 56	0 56	0 56	0 56	0 55	0 54	0 52	0 50	0 48	0 46	0 43		12
	24	1 5	1 6	1 6	1 6	1 6	1 5	1 4	1 3	1 1	0 59	0 57		6
1	00	1 12	1 14	1 15	1 16	1 17	1 16	1 16	1 15	1 14	1 12	1 10	11	00
	6	1 19	1 21	1 23	1 24	1 26	1 27	1 27	1 26	1 26	1 25	1 23		24
	12	1 24	1 27	1 30	1 32	1 34	1 36	1 36	1 37	1 37	1 36	1 35		18
	18	1 28	1 32	1 36	1 38	1 41	1 43	1 45	1 46	1 47	1 46	1 46		12
	24	1 31	1 36	1 40	1 44	1 47	1 50	1 53	1 54	1 55	1 56	1 56		6
2	00	1 32	1 38	1 43	1 48	1 52	1 56	1 59	2 1	2 3	2 4	2 5	10	00
	6	1 32	1 39	1 45	1 50	1 55	2 0	2 3	2 7	2 9	2 11	2 12		24
	12	1 21	1 38	1 46	1 51	1 57	2 2	2 7	2 11	2 14	2 17	2 19		18
	18	1 29	1 36	1 45	1 51	1 57	2 3	2 9	2 13	2 18	2 21	2 24		12
	24	1 24	1 33	1 44	1 49	1 56	2 3	2 9	2 15	2 20	2 24	2 27		6
3	00	1 19	1 28	1 37	1 45	1 53	2 0	2 8	2 14	2 20	2 25	2 29	9	00
	6	1 12	1 21	1 31	1 40	1 48	1 57	2 5	2 12	2 18	2 24	2 30		24
	12	1 4	1 14	1 24	1 33	1 42	1 51	2 0	2 9	2 15	2 22	2 28		18
	18	0 55	1 5	1 15	1 25	1 35	1 45	1 54	2 3	2 11	2 18	2 25		12
	24	0 44	0 55	1 5	1 16	1 26	1 36	1 46	1 56	2 5	2 13	2 20		6
4	00	0 33	0 44	0 54	1 6	1 16	1 26	1 37	1 47	1 57	2 6	2 14	8	00
	6	0 20	0 31	0 42	0 54	1 4	1 15	1 26	1 37	1 47	1 57	2 6		24
	12	0 A7	0 18	0 29	0 40	0 51	1 2	1 14	1 25	1 36	1 47	1 57		18
	18	0 7	0 4	0 15	0 26	0 37	0 49	1 1	1 13	1 24	1 35	1 46		12
	24	0 21	A 11	0 A0	0 11	0 23	0 35	0 47	0 59	1 11	1 22	1 33		6
5	00	0 35	0 25	0 15	0 A4	0 8	0 20	0 32	0 44	0 56	1 8	1 20	7	00
	6	0 50	0 40	0 30	0 19	0 A8	0 4	0 16	0 28	0 41	0 53	1 5		24
	12	1 4	0 55	0 45	0 35	0 24	A 12	0 A0	0 12	0 25	0 37	0 50		18
	18	1 18	1 10	1 1	0 51	0 40	0 28	0 16	0 A4	0 8	0 21	0 33		12
	24	1 31	1 24	1 15	1 6	0 56	0 45	0 33	0 21	0 A8	0 4	0 17		6
6	00	1 44	1 37	1 29	1 21	1 11	1 0	0 49	0 37	0 25	A 13	0 0	6	00
From ☌ or ☍ to □.		Sub.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Subs.	Adde	From □ to ☌ or ☍.	
		D 0	27	24	21	18	15	12	9	6	3	0		
		S 4	3	3	3	3	3	3	3	3	3	3		
		True Distance of ☾ from ☉, from □ to ☌ or ☍.												

A Table of the Reflection and Variation of the Moons Æquation.

Anomalie ☾ co-æquated.		True Distance of ☾ from ☉, or from her ☍ to □.											Anomalie ☾ co-æquated.	
		S 2 D 0	2 3	2 6	2 9	2 12	2 15	2 18	2 21	2 24	2 27	3 0		
		Add	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*		
S	D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	S	D
6	00	1 44	1 37	1 29	1 21	1 11	1 0	0 49	0 37	0 25	0 13	0 0	6	00
	06	1 56	1 50	1 43	1 35	1 26	1 16	1 5	0 54	0 42	0 29	0 17		24
	12	2 7	2 2	1 56	1 48	1 40	1 30	1 20	1 9	0 58	0 46	0 33		18
	18	2 17	2 12	2 7	2 0	1 53	1 44	1 35	1 24	1 13	1 2	0 50		12
	24	2 25	2 22	2 17	2 11	2 5	1 57	1 48	1 38	1 28	1 17	1 5		6
7	00	2 31	2 30	2 26	2 21	2 15	2 8	2 0	1 51	1 41	1 31	1 20	5	00
	6	2 38	2 36	2 34	2 30	2 24	2 18	2 11	2 3	1 54	1 44	1 33		24
	12	2 42	2 42	2 40	2 36	2 32	2 27	2 20	2 13	2 5	1 56	1 46		18
	18	2 45	2 45	2 44	2 42	2 38	2 34	2 28	2 22	2 14	2 6	1 57		12
	24	2 46	2 47	2 47	2 45	2 43	2 39	2 35	2 29	2 22	2 15	2 6		6
8	00	2 46	2 48	2 48	2 47	2 46	2 43	2 39	2 34	2 29	2 22	2 14	4	00
	6	2 45	2 47	2 48	2 48	2 47	2 45	2 42	2 38	2 33	2 27	2 20		24
	12	2 42	2 44	2 46	2 47	2 47	2 46	2 44	2 40	2 37	2 31	2 25		18
	18	2 37	2 41	2 43	2 45	2 45	2 45	2 43	2 41	2 38	2 33	2 28		12
	24	2 32	2 36	2 39	2 31	2 42	2 42	2 41	2 40	2 37	2 34	2 30		6
9	00	2 25	2 29	2 33	2 35	2 37	2 38	2 38	2 37	2 35	2 33	2 29	3	00
	6	2 17	2 22	2 25	2 29	2 31	2 32	2 33	2 33	2 32	2 30	2 27		24
	12	2 8	2 13	2 17	2 21	2 24	2 26	2 27	2 27	2 27	2 26	2 24		18
	18	1 58	2 3	2 8	2 12	2 15	2 17	2 19	2 20	2 21	2 20	2 19		12
	24	1 48	1 53	1 58	2 2	2 5	2 8	2 11	2 12	2 13	2 13	2 12		6
10	00	1 37	1 42	1 47	1 51	1 55	1 58	2 1	2 3	2 4	2 5	2 5	2	00
	6	1 25	1 30	1 35	1 39	1 43	1 47	1 50	1 52	1 54	1 55	1 56		24
	12	1 13	1 18	1 23	1 27	1 31	1 35	1 38	1 41	1 43	1 45	1 46		18
	18	1 0	1 5	1 10	1 14	1 18	1 22	1 25	1 28	1 31	1 33	1 35		12
	24	0 48	0 52	0 57	1 1	1 5	1 9	1 12	1 16	1 18	1 21	1 23		6
11	00	0 35	0 39	0 44	0 48	0 52	0 55	0 59	1 2	1 5	1 8	1 10	1	00
	6	0 22	0 26	0 30	0 34	0 38	0 41	0 45	0 48	0 51	0 54	0 57		24
	12	0 10	0 13	0 17	0 20	0 24	0 27	0 31	0 34	0 37	0 40	0 43		18
	18	0 S 3	0 S 0	0 4	0 7	0 10	0 13	0 16	0 20	0 23	0 26	0 29		12
	24	0 14	0 12	S 10	0 S 7	0 S 4	0 S 1	0 2	0 5	0 8	0 12	0 15		6
12	00	0 26	0 24	0 22	0 20	0 17	0 15	S 12	0 S 9	0 S 6	0 S 3	0 0	0	00
From ☌ or ☍ to □.		*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Add*	*Sub.*	From □ to ☌ or ☍.	
		D 0	27	24	21	18	15	12	9	6	3	0		
		S 4	3	3	3	3	3	3	3	3	3	3		
		True Distance of ☾ from ☉, from □ to ☌ or ☍.												

The Sexagenarie Table of the Motion of the Moone from the Sunne in Longitude.

Degrees.	S D ' "	D ' " '''	' " ''' ''''	" ''' '''' v	Degrees.	S D ' "	D ' " '''	' " ''' ''''	" ''' '''' v
0	0	0	0	0	30	6	5	43	21
1	0	12	11	27	31	6	17	54	47
2	0	24	22	53	32	6	30	6	14
3	0	36	34	20	33	6	42	17	41
4	0	48	45	37	34	6	54	29	7
5	1	0	57	13	35	7	6	40	34
6	1	13	8	40	36	7	18	52	1
7	1	25	20	7	37	7	31	3	28
8	1	37	31	34	38	7	43	14	54
9	1	49	43	0	39	7	55	26	21
10	2	1	54	27	40	8	7	37	48
11	2	14	5	54	41	8	19	49	14
12	2	26	17	20	42	8	32	0	41
13	2	38	28	47	43	8	44	12	8
14	2	50	40	14	44	8	56	23	34
15	3	2	51	40	45	9	8	35	1
16	3	15	3	7	46	9	20	46	28
17	3	27	14	34	47	9	32	57	54
18	3	39	26	0	48	9	45	9	21
19	3	51	37	27	49	9	57	20	48
20	4	3	48	54	50	10	9	32	15
21	4	16	0	20	51	10	21	43	41
22	4	28	11	47	52	10	33	55	8
23	4	40	23	14	53	10	46	6	35
24	4	52	34	41	54	10	58	18	1
25	5	4	46	7	55	11	10	29	28
26	5	16	57	34	56	11	22	40	55
27	5	29	9	1	57	11	34	52	21
28	5	41	20	27	58	11	47	3	48
29	5	53	31	54	59	11	59	15	15
30	6	5	43	21	60	12	11	26	41

A Table of the Reduction of the Moone from Her Orbite to the Eclip-tiqne, & contrariwise.

Degrees.	Sign. 0 Sign. 6 Adde. '	"	Signe 1 Signe 7 Adde. '	"	Signe 2 Signe 8 Adde. '	"	Degrees.
0	0	0	6	6	6	6	30
1	0	15	6	12	5	58	29
2	0	30	6	18	5	49	28
3	0	45	6	24	5	40	27
4	0	59	6	29	5	32	26
5	1	13	6	39	5	22	25
6	1	27	6	40	5	13	24
7	1	42	6	44	5	2	23
8	1	56	6	47	4	52	22
9	2	10	6	51	4	31	21
10	2	24	6	54	4	30	20
11	2	38	6	56	4	19	19
12	2	52	6	57	4	8	18
13	3	6	6	58	3	56	17
14	3	19	6	59	3	43	16
15	3	32	7	0	3	32	15
16	3	43	6	59	3	19	14
17	3	56	6	58	3	6	13
18	4	8	6	57	2	51	12
19	4	19	6	56	2	38	11
20	4	30	6	54	2	23	10
21	4	41	6	51	2	9	9
22	4	52	6	47	1	56	8
23	5	2	6	44	1	42	7
24	5	13	6	40	1	27	6
25	5	22	6	35	1	13	5
26	5	31	6	28	0	59	4
27	5	40	1	23	0	45	3
28	5	49	6	17	0	30	2
29	5	58	6	11	0	15	1
30	6	6	6	6	0	0	0
Degrees.	Substr. Signe 5 Sign 11		Substr. Signe 4 Sign 10		Substr. Signe 3 Signe 9		Degrees.

A Table of the Proportionall minutes of the *Moons* Latitude.

Enter this Table with the Æquated distance of the Moon from the Sun.

Degrees.	Signe 0.		Signe 1.		Signe 2.		Degrees.
	Prop.	min.	Propo.	min.	Propo.	min.	
	′	″	′	″	′	″	
0	0	0	15	0	45	0	30
1	0	1	15	55	45	54	29
2	0	4	16	51	46	47	28
3	0	10	17	48	47	38	27
4	0	18	18	46	48	29	26
5	0	27	19	44	49	17	25
6	0	33	20	43	50	5	24
7	0	53	21	44	50	51	23
8	1	10	22	45	51	35	22
9	1	28	23	46	52	17	21
10	1	49	24	48	52	59	20
11	2	11	25	49	53	38	19
12	2	36	26	51	54	16	18
13	3	3	27	53	54	52	17
14	3	31	28	56	55	27	16
15	4	1	30	0	55	59	15
16	4	33	31	4	56	29	14
17	5	8	32	7	56	57	13
18	5	44	33	10	57	24	12
19	6	22	34	11	57	49	11
20	7	1	35	12	58	11	10
21	7	43	36	14	58	32	9
22	8	25	37	16	58	50	8
23	9	9	38	17	59	7	7
24	9	55	39	17	59	21	6
25	10	43	40	16	59	33	5
26	11	31	41	14	59	42	4
27	12	22	42	12	59	50	3
28	13	19	43	9	59	56	2
29	14	6	44	5	59	59	1
30	15	0	45	0	60	0	0
	Signe 5.		Signe 4.		Signe 3.		

Enter this Table with the Æquated distance of the Moon from the Sun.

A Table of the Latitude of the Moon.

Nor	Signe. 0.					Signe. 1.					Signe. 2.					Asc.
Sou	Signe. 6.					Signe. 7.					Signe. 8.					Desc
Degres	Latitude ☾ D	′	″	Excess. ′	″	Latitude ☾ D	′	″	Excess. ′	″	Latitude ☾ D	′	″	Excess. ′	″	Degres
0	0	0	0	0	0	2	29	52	8	30	4	19	43	14	43	30
1	0	5	14	0	18	2	34	22	8	45	4	22	18	14	52	29
2	0	10	27	0	36	2	38	50	9	0	4	24	49	15	0	28
3	0	15	41	0	54	2	43	15	9	15	4	27	14	15	8	27
4	0	20	54	1	12	2	47	37	9	30	4	29	34	15	16	26
5	0	26	17	1	29	2	51	56	9	45	4	31	50	15	24	25
6	0	31	19	1	47	2	56	11	10	0	4	34	0	15	31	24
7	0	36	31	2	5	3	0	24	10	14	4	36	6	15	38	23
8	0	41	42	2	22	3	4	33	10	28	4	38	6	15	45	22
9	0	46	52	2	40	3	8	39	10	42	4	40	2	15	52	21
10	0	52	2	2	57	3	12	42	11	56	4	41	52	15	58	20
11	0	57	10	3	15	3	16	41	11	9	4	43	37	16	4	19
12	1	2	18	3	32	3	20	36	11	22	4	45	17	16	10	18
13	1	7	24	3	49	3	24	28	11	35	4	46	52	16	15	17
14	1	12	29	4	7	3	28	16	11	48	4	48	21	16	20	16
15	1	17	33	4	24	3	32	0	12	1	4	49	45	16	25	15
16	1	22	36	4	41	3	35	40	12	13	4	51	4	16	29	14
17	1	27	37	4	58	3	39	17	12	25	4	52	17	16	33	13
18	1	32	36	5	15	3	42	49	12	37	4	53	26	16	37	12
19	1	37	34	5	32	3	46	17	12	49	4	54	29	16	41	11
20	1	42	30	5	49	3	49	42	13	1	4	55	26	16	44	10
21	1	47	24	6	5	3	53	2	13	12	4	56	18	16	47	9
22	1	52	16	6	22	3	56	17	13	23	4	57	4	16	49	8
23	1	57	6	6	38	3	59	29	13	34	4	57	45	16	52	7
24	2	1	54	6	55	4	2	36	13	45	4	58	21	16	54	6
25	2	6	39	7	11	4	5	38	13	55	4	58	51	16	56	5
26	2	11	23	7	27	4	8	37	14	5	4	59	16	16	57	4
27	2	16	4	7	43	4	11	30	14	14	4	59	35	16	58	3
28	2	20	42	7	58	4	14	19	14	24	5	59	49	16	59	2
29	2	25	18	8	14	4	17	4	14	33	4	59	57	17	0	1
30	2	29	52	8	30	4	19	43	14	43	5	0	0	17	0	0
S	Signe. 11.					Signe. 10.					Signe. 9.					A
N	Signe. 5.					Signe. 4.					Signe. 3.					D

A Table of the Horizontall Parallax, Hourely Motions, and Semidiameters of the Sunne and Moon.

Anom. ☉ & ☾ coæqu. S D	Horisō. Paralla of ☉. ′ ″	Hourly motion of ☉. ′ ″	Semidiamerer of ☉ ′ ″	Horizō-tall Par. of ☾. ′ ″	Hourely motion of ☾. ′ ″	Semidi-ameter of ☾ ′ ″	Anom. ☉ & ☾ coæq. S D
0 0	2 18	2 23	16 9	55 43	29 40	15 35	12 0
6	2 18	2 23	16 9	55 43	29 41	15 35	24
12	2 18	2 23	16 9	55 46	29 44	15 36	18
18	2 18	2 23	16 10	55 50	29 49	15 37	12
24	2 18	2 23	16 10	55 55	29 58	15 38	6
1 0	2 19	2 24	16 11	56 1	30 9	15 40	11 0
6	2 19	2 24	16 12	56 7	30 22	15 42	24
12	2 19	2 24	16 14	56 16	30 37	15 44	18
18	2 19	2 25	16 15	56 27	30 54	15 47	12
24	2 19	2 25	16 16	56 38	31 12	15 50	6
2 0	2 20	2 25	16 18	56 50	31 33	15 54	10 0
6	2 20	2 26	16 19	57 5	31 56	15 58	24
12	2 20	2 26	16 21	57 20	32 19	16 2	18
18	2 20	2 27	16 22	57 34	32 43	16 6	12
24	2 20	2 27	16 24	57 50	33 7	16 9	6
3 0	2 20	2 28	16 25	58 5	33 42	16 13	9 0
6	2 21	2 29	16 29	58 20	33 58	16 17	24
12	2 21	2 29	16 31	58 37	34 23	16 22	18
18	2 21	2 30	16 33	58 53	34 47	16 27	12
24	2 21	2 30	16 35	59 7	35 11	16 31	6
4 0	2 21	2 31	16 37	59 22	35 35	16 36	8 0
6	2 21	2 31	16 38	59 37	35 59	16 39	24
12	2 22	2 32	16 39	59 51	36 22	16 42	18
18	2 22	2 32	16 40	60 4	36 43	16 46	12
24	2 22	2 32	16 41	60 14	37 3	16 49	6
5 0	2 22	2 32	16 42	60 23	37 22	16 52	7 0
6	2 22	2 33	16 43	60 32	37 38	16 55	24
12	2 22	2 33	16 44	60 39	37 52	16 57	18
18	2 23	2 33	16 44	60 44	38 1	16 58	12
24	2 23	2 33	16 45	60 48	38 7	16 59	6
6 0	2 23	2 33	16 45	60 49	38 10	17 0	6 0

A Table ſhewing the Diſtance of the true Oppoſition and Conjunction, from the greateſt Obſcuration.

Latitude. Min.	Difference. ′	″	Latitude. Min.	Difference. ′	″	Latitude. Min	Difference. ′	″
0	0	0	30	2	37	60	5	14
1	0	5	31	2	42	61	5	19
2	0	10	32	2	47	62	5	24
3	0	16	33	2	53	63	5	30
4	0	21	34	2	58	64	5	35
5	0	26	35	3	3	65	5	40
6	0	31	36	3	8	66	5	45
7	0	36	37	3	13	67	5	50
8	0	42	38	3	19	68	5	56
9	0	47	39	3	24	69	6	1
10	0	52	40	3	29	70	6	6
11	0	57	41	3	34	71	6	11
12	1	2	42	3	39	72	6	17
13	1	8	43	3	45	73	6	22
14	1	13	44	3	50	74	6	27
15	1	18	45	3	55	75	6	33
16	1	23	46	4	0	76	6	38
17	1	28	47	4	5	77	6	43
18	1	34	48	4	11	78	6	49
19	1	39	49	4	16	79	6	54
20	1	45	50	4	21	80	6	59
21	1	50	51	4	26	81	7	4
22	1	55	52	4	31	82	7	9
23	2	1	53	4	37	83	7	15
24	2	6	54	4	42	84	7	20
25	2	11	55	4	47	85	7	25
26	2	16	56	4	52	86	7	30
27	2	21	57	4	57	87	7	35
28	2	27	58	5	3	88	7	41
29	2	32	59	5	8	89	7	46
30	2	37	60	5	14	90	7	51

Latitude { North Deſcending, South Aſcending } Adde.
Latitude { North Aſcending, South Deſcending } Subſtract.

A Table of the Declination of the Ecliptique, and of the angls of the Ecliptique and Meridian Circle.

	♈			♎		♉			♏		♊			♐		
Deg. Desc	Declinatió			Angle of Ecli. & Meridian.		Declinatió			Angle of Ecli. & Meridian.		Declinatió			Angle of Ecli. & Meridian.		Deg Asce.
	D	′	″	D	′	D	′	″	D	′	D	′	″	D	′	
0	0	0	0	66	29	11	30	42	69	21	20	13	22	77	44	30
1	0	23	56	66	30	11	51	48	69	32	20	25	57	78	6	29
2	0	47	53	66	30	12	12	40	69	45	20	38	9	78	28	28
3	1	11	49	66	31	12	33	21	69	57	20	49	58	78	50	27
4	1	35	49	66	33	12	53	50	70	10	21	1	25	79	13	26
5	1	59	37	66	34	13	14	5	70	23	21	12	9	79	35	25
6	2	23	28	66	36	13	34	7	70	36	21	23	7	79	58	24
7	2	47	16	66	39	13	53	57	70	51	21	33	22	80	21	23
8	3	11	4	66	42	14	13	32	71	5	21	43	15	80	44	22
9	3	34	47	66	45	14	32	53	71	20	21	51	14	81	8	21
10	3	58	28	66	49	14	51	59	71	34	22	1	45	81	32	20
11	4	22	4	66	52	15	10	50	71	50	22	10	22	81	57	19
12	4	45	37	66	56	15	29	26	72	6	22	18	35	82	21	18
13	5	9	5	67	1	15	47	47	72	22	22	26	22	82	45	17
14	5	32	29	67	7	16	5	51	72	38	22	33	44	83	10	16
15	5	55	47	67	12	16	23	39	72	54	22	40	39	83	35	15
16	6	18	58	67	18	16	41	9	73	10	22	47	10	84	0	14
17	6	42	6	67	24	16	58	22	73	27	22	53	13	83	25	13
18	7	5	6	67	30	17	15	18	73	45	22	58	51	84	50	12
19	7	28	0	67	38	17	31	54	74	5	23	4	3	85	15	11
20	7	50	46	67	46	17	48	14	74	23	23	8	47	85	41	10
21	8	13	26	67	53	18	4	14	74	41	23	13	5	86	6	9
22	8	35	58	68	1	18	19	57	75	0	23	16	56	86	32	8
23	8	58	20	68	10	18	35	18	75	19	23	20	20	86	58	7
24	9	20	34	68	20	18	50	21	75	39	23	23	18	87	24	6
25	9	42	41	68	28	19	5	4	75	59	23	25	48	87	50	5
26	10	4	38	68	38	19	19	26	76	20	23	27	51	88	16	4
27	10	26	24	68	48	19	33	27	76	40	23	29	27	88	42	3
28	10	48	2	68	59	19	47	7	77	1	23	30	35	89	8	2
29	11	9	27	69	10	20	0	26	77	23	23	31	17	89	34	1
30	11	30	42	69	21	20	13	22	77	44	23	31	30	90	0	0
	♍			♓		♌			♒		♋			♑		

see further for y^e use direction of this table in page 118

A Table of the Refraction of the Sun, Moon, and Fixed Stars, according to the Observations of *Tycho Brahe*.

Degres of Altitude.	☉ ′	″	☾ ′	″	Stars. ′	″	Degres of Altitude.	☉ ′	″	☾ ′	″
0	34	0	33	0	30	0	23	3	10	4	10
1	26	0	25	0	21	30	24	2	50	3	45
2	20	0	20	0	15	30	25	2	30	3	20
3	17	0	17	0	12	30	26	2	15	3	40
4	15	30	15	20	11	0	27	2	0	3	0
5	14	30	14	20	10	0	28	1	45	2	30
6	13	30	13	50	9	0	29	1	35	2	0
7	12	45	12	45	8	15	30	1	25	1	40
8	11	15	12	0	6	45	31	1	15	1	30
9	10	30	11	20	6	0	32	1	5	1	20
10	10	0	10	45	5	30	33	0	55	1	10
11	9	30	10	10	5	0	34	0	45	1	0
12	9	0	9	35	4	30	35	0	35	0	50
13	8	30	9	0	4	0	36	0	30	0	45
14	8	0	8	30	3	30	37	0	25	0	40
15	7	30	8	0	3	0	38	0	20	0	35
16	7	0	7	30	2	30	39	0	15	0	30
17	6	30	7	0	2	0	40	0	10	0	25
18	5	45	6	30	1	15	41	0	9	0	20
19	5	0	6	0	0	30	42	0	8	0	15
20	4	30	4	30	0	0	43	0	7	0	10
21	4	0	5	0	0	0	44	0	6	0	5
22	3	30	4	35			45	0	5	0	0

The Refraction is to be taken from the Altitude Observed, that the true Altitude may be had: being also to be corrected by Parallax.

A Table of the Middle Motion of SATURN, for Yeares of the Christian Æra, according to the Julian Account.

Yeares of Christ.	Longitude of ♄ S	D	′	″	Aphelion of ♄ S	D	′	″	Nod. Ascen. ♄ S	D	′	″
001	2	12	52	01	7	20	18	42	3	04	28	29
101	7	06	20	21	7	22	32	32	3	05	28	44
201	11	29	48	40	7	24	46	22	3	06	28	59
301	4	23	17	00	7	27	0	12	3	07	29	14
401	9	16	45	20	7	29	14	2	3	08	29	29
501	2	10	13	39	8	01	27	52	3	09	29	44
601	7	03	41	59	8	03	41	41	3	10	29	59
701	11	27	10	19	8	05	55	31	3	11	30	15
801	4	20	38	39	8	08	09	21	3	12	30	30
901	9	14	06	59	8	10	23	11	3	13	30	45
1001	2	07	35	18	8	12	37	01	3	14	31	00
1101	7	01	03	38	8	14	50	51	3	15	31	15
1201	11	24	31	58	8	17	04	40	3	16	31	30
1301	4	18	00	18	8	19	18	30	3	17	31	45
1401	9	11	28	38	8	21	32	20	3	18	32	00
1501	2	04	56	57	8	23	46	10	3	19	32	15
1601	6	28	25	17	8	26	00	00	3	20	32	31
1701	11	21	53	37	8	28	13	49	3	21	32	46
1801	4	15	21	57	9	00	27	39	3	22	33	01
1901	9	08	50	17	9	02	41	29	3	23	33	16
2001	2	02	18	36	9	04	55	19	3	24	33	31
2101	6	25	46	56	9	07	09	09	3	25	33	46
2201	11	19	15	16	9	09	22	59	3	26	34	01
2301	4	12	43	36	9	11	36	48	3	27	34	16
2401	9	06	11	56	9	13	50	38	3	28	34	31
2501	1	29	40	15	9	16	04	28	3	29	34	46
2601	6	23	08	35	9	18	18	18	4	00	35	02
2701	11	16	36	55	9	20	32	08	4	01	35	17
2801	4	10	05	15	9	22	45	58	4	02	35	32
2901	9	03	33	35	9	24	59	47	4	03	35	47
3001	1	27	01	54	9	27	13	37	4	04	36	02
4001	1	21	45	12	10	19	31	55	4	14	38	33
5001	1	16	28	30	11	11	50	13	4	24	41	04
6001	1	11	11	48	0	04	08	31	5	04	43	35
7001	1	05	55	06	0	26	26	49	5	14	46	06
8001	1	00	38	24	1	18	49	07	5	24	48	37

Months	Com. Ye. Lon. ♄ D	′	″	Biss. Year Longi ♄ D	′	″	Aph. ♄ D	′	″	No. As. ♄ D	′	″
Januar.	0	0	0	0	0	00	0	0	0	0	0	0
Febru.	1	2	18	1	2	18	0	0	6	0	0	3
March	1	58	35	2	0	35	0	0	12	0	0	6
Aprill	3	0	53	3	2	54	0	0	19	0	0	9
May	4	1	11	4	3	12	0	0	27	0	0	12
June	5	3	29	5	5	30	0	0	35	0	0	15
July	6	3	46	6	5	47	0	0	41	0	0	18
August	7	6	4	7	8	04	0	0	47	0	0	21
Septēb	8	8	23	8	10	23	0	0	54	0	0	24
Octob.	9	8	40	9	10	41	0	1	0	0	0	27
Nove.	10	10	58	10	12	59	0	1	7	0	0	30
Decem	11	11	16	11	13	17	0	1	13	0	0	33

A Table of the Annuall Motion of ♄, for supplying the intermediate Yeares of the former Table.

	Years included.	Longitude of ♄ S	D	′	″	Aphelion of ♄ S	D	′	″	No. Asc. ♄ D	′	″
	80	8	18	46	40	0	1	47	04	0	48	12
	60	0	14	05	00	0	1	20	18	0	36	09
	40	4	09	23	20	0	0	53	32	0	24	06
	20	8	04	41	40	0	0	26	46	0	12	03
	1	0	12	13	34	0	0	01	20	0	00	36
	2	0	24	27	10	0	0	2	41	0	01	12
	3	1	06	40	44	0	0	4	01	0	01	48
B	4	1	18	56	20	0	0	5	21	0	02	25
	5	2	01	09	54	0	0	6	41	0	03	01
	6	2	13	23	30	0	0	8	02	0	03	37
	7	2	25	37	04	0	0	9	22	0	04	13
B	8	3	07	52	40	0	0	10	42	0	04	49
	9	3	20	06	15	0	0	12	03	0	05	25
	10	4	02	19	49	0	0	13	23	0	06	01
	11	4	14	33	24	0	0	14	43	0	06	37
B	12	4	26	48	59	0	0	16	04	0	07	14
	13	5	09	02	34	0	0	17	24	0	07	50
	14	5	21	16	09	0	0	18	44	0	08	26
	15	6	03	29	43	0	0	20	04	0	09	02
B	16	6	15	45	19	0	0	21	25	0	09	38
	17	6	27	58	59	0	0	22	45	0	10	14
	18	7	10	12	29	0	0	24	05	0	10	51
	19	7	26	36	04	0	0	25	26	0	11	27
B	20	8	04	41	40	0	0	26	46	0	12	03

Dayes.	Longit. of ♄ D	′	″	H ′	Lon. ♄ ′	″	H ′	Lonit. ♄ ′	″
1	0	02	00	1	0	05	31	2	36
2	0	04	01	2	0	10	32	2	41
3	0	06	02	3	0	15	33	2	46
4	0	08	02	4	0	20	34	2	51
5	0	10	03	5	0	25	35	2	56
6	0	12	04	6	0	30	36	3	01
7	0	14	04	7	0	35	37	3	06
8	0	16	05	8	0	40	38	3	11
9	0	18	05	9	0	45	39	3	16
10	0	20	06	10	0	50	40	3	22
11	0	22	07	11	0	55	41	3	27
12	0	24	07	12	1	00	42	3	32
13	0	26	08	13	1	05	43	3	37
14	0	28	08	14	1	10	44	3	42
15	0	30	09	15	1	15	45	3	47
16	0	32	09	16	1	20	46	3	52
17	0	34	10	17	1	25	47	3	57
18	0	36	11	18	1	30	48	4	02
19	0	38	11	19	1	35	49	4	07
20	0	40	12	20	1	40	50	4	12
21	0	42	12	21	1	45	51	4	17
22	0	44	13	22	1	50	52	4	22
23	0	46	14	23	1	55	53	4	27
24	0	48	14	24	2	00	54	4	32
25	0	50	15	25	2	06	55	4	37
26	0	52	15	26	2	11	56	4	42
27	0	54	16	17	2	16	57	4	48
28	0	56	17	28	2	21	58	4	53
29	0	58	17	29	2	26	59	4	58
30	1	00	18	30	2	31	60	5	03
31	1	02	18						

A Table of the absolute Æquation of the first inequality of Saturn.

Signe 0.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♄ Substract D	′	″	Distance of ♄ from ☉.
0	0	0	0	0	0	0	0	1008090
1	0	0	56	27	0	6	29	1008079
2	0	1	52	56	0	12	56	1008052
3	0	2	49	24	0	19	26	1008011
4	0	3	45	51	0	25	54	1007953
5	0	4	42	19	0	32	28	1007880
6	0	5	38	47	0	38	57	1007799
7	0	6	35	14	0	45	26	1007707
8	0	7	31	44	0	51	51	1007592
9	0	8	28	14	0	58	14	1007467
10	0	9	24	45	1	4	28	1007337
11	0	10	21	16	1	11	0	1007180
12	0	11	17	48	1	17	22	1007025
13	0	12	14	21	1	23	43	1006823
14	0	13	10	54	1	30	2	1006618
15	0	14	7	28	1	36	21	1006390
16	0	15	4	4	1	42	37	1006178
17	0	16	0	40	1	48	52	1006[illegible]35
18	0	16	57	17	1	55	5	1005609
19	0	17	53	53	2	1	18	1005396
20	0	18	50	33	2	7	25	1005102
21	0	19	47	13	2	14	31	1004791
22	0	20	43	55	2	1[illegible]	37	1004537
23	0	21	40	39	2	25	3[illegible]	1004179
24	0	22	37	24	2	31	39	1003839
25	0	23	34	12	2	37	35	1003482
26	0	24	31	3	2	43	30	1003095
27	0	25	27	55	2	49	22	1002720
28	0	26	24	44	2	55	11	1002274
29	0	27	21	44	3	0	58	1001882
30	0	28	18	43	3	6	41	1001501
Anomal.					Adde.			

Signe 11.

Signe 1.

Anomalie co-æquated. S	D	′	″	Æquati. ♄ Substract. D	′	″	Distance of ♄ from ☉.	Degrees.
0	28	18	43	3	6	41	1001501	30
0	29	15	42	3	12	21	1001049	29
1	0	12	43	3	17	58	1000586	28
1	1	9	44	3	23	33	1000123	27
1	2	6	49	3	29	5	999649	26
1	3	3	55	3	34	35	999154	25
1	4	1	4	3	40	1	998666	24
1	4	58	16	3	45	23	998143	23
1	5	55	30	3	50	42	997617	22
1	6	52	46	3	55	57	997068	21
1	7	50	3	4	1	8	996527	20
1	8	47	24	4	6	15	995975	19
1	9	44	48	4	11	18	995397	18
1	10	42	15	4	16	18	994743	17
1	11	39	45	4	21	14	994200	16
1	12	37	17	4	26	7	993584	15
1	13	34	52	4	30	54	992960	14
1	14	32	30	4	35	35	992315	13
1	15	30	10	4	40	14	991650	12
1	16	27	53	4	44	47	990990	11
1	17	25	40	4	49	14	990327	10
1	18	23	29	4	53	37	989653	9
1	19	21	20	4	57	57	988950	8
1	20	19	13	5	2	22	988229	7
1	21	17	9	5	6	33	987520	6
1	22	15	9	5	10	41	986803	5
1	23	13	12	5	14	42	986070	4
1	24	11	21	5	18	38	985302	3
1	25	9	31	5	22	29	984550	2
1	26	7	46	5	26	15	983789	1
1	27	6	4	5	29	59	983020	0
				Adde.				Anom.

Signe 10.

A Table of the absolute Æquation of the first inequality of Saturn.

Signe 2.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♄ Substract. D	′	″	Distance of ♄ from ☉
0	1	27	6	4	5	29	59	983020
1	1	28	4	24	5	33	35	982235
2	1	29	2	48	5	37	6	981437
3	2	0	1	15	5	40	33	980628
4	2	0	59	45	5	43	53	979820
5	2	1	58	18	5	47	9	979005
6	2	2	56	55	5	50	15	978178
7	2	3	55	37	5	53	18	977355
8	2	4	54	22	5	56	13	976489
9	2	5	53	10	5	59	4	975639
10	2	6	52	0	6	1	48	974779
11	2	7	50	54	6	4	27	973916
12	2	8	49	52	6	7	2	973041
13	2	9	48	55	6	9	30	972159
14	2	10	48	1	6	11	53	971274
15	2	11	47	10	6	14	8	970386
16	2	12	46	22	6	16	15	969492
17	2	13	45	39	6	18	16	968573
18	2	14	45	0	6	20	10	967685
19	2	15	44	24	6	22	0	966766
20	2	16	43	53	6	23	42	965847
21	2	17	43	23	6	25	17	964930
22	2	18	42	58	6	26	45	963997
23	2	19	42	37	6	28	7	963055
24	2	20	42	18	6	29	22	962122
25	2	21	42	2	6	30	28	961180
26	2	22	41	51	6	31	29	960364
27	2	23	41	44	6	32	25	959288
28	2	24	41	42	6	33	14	958339
29	2	25	41	42	6	33	55	957388
30	2	26	41	46	6	34	28	956427
Anomal.	Adde.							

Signe 9.

Signe 3.

Anomalie co-æquated. S	D	′	″	Æquati. ♄ Substract. D	′	″	Distance of ♄ fró ☉	Degrees
2	26	41	46	6	34	28	956425	30
2	27	41	55	6	34	54	955471	29
2	28	42	6	6	35	13	954516	28
2	29	42	20	6	35	24	953559	27
3	0	42	39	6	35	24	952601	26
3	1	43	2	6	35	21	951644	25
3	2	43	30	6	35	17	950601	24
3	3	43	59	6	34	58	949722	23
3	4	44	32	6	34	33	948763	22
3	5	45	8	6	33	59	947806	21
3	6	45	48	6	33	18	946848	20
3	7	46	31	6	32	31	945886	19
3	8	47	17	6	31	38	944935	18
3	9	48	7	6	30	34	943977	17
3	10	49	0	6	29	26	943022	16
3	11	49	58	6	28	8	942074	15
3	12	51	0	6	26	45	941124	14
3	13	52	5	6	25	13	940174	13
3	14	53	12	6	23	33	939234	12
3	15	54	23	6	21	46	938295	11
3	16	55	38	6	19	52	937357	10
3	17	56	57	6	17	49	936421	9
3	18	58	18	6	15	40	935493	8
3	19	59	42	6	13	24	934572	7
3	21	1	9	6	10	58	933654	6
3	22	2	39	6	8	25	932738	5
3	23	3	11	6	5	45	931845	4
3	24	5	48	6	3	0	930942	3
3	25	7	27	6	0	5	930052	2
3	26	9	9	5	57	4	929125	1
3	27	10	55	5	53	55	928295	0
Adde.								Anomal.

Signe 8.

A Table of the absolute Æquation of the first inequality of Saturn.

	Signe 4.								Signe 5.								
Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♄ Substract. D	′	″	Distance of ♄ from ☉.	Anomalie co-æquated. S	D	′	″	Æquati. ♄ Substract. D	′	″	Distance of ♄ from ☉.	Degrees.
0	3	27	10	55	5	53	55	928295	4	28	23	38	3	28	52	906637	30
1	3	28	12	43	5	50	40	927430	4	29	26	34	3	22	35	906122	29
2	3	29	14	35	5	47	17	926564	5	0	29	34	3	16	15	905618	28
3	4	0	16	30	5	43	47	925712	5	1	32	34	3	9	52	905128	27
4	4	1	18	28	5	40	9	924862	5	2	35	36	3	3	27	904670	26
5	4	2	20	31	5	36	25	924022	5	3	38	40	2	56	54	904225	25
6	4	3	22	36	5	32	34	923171	5	4	41	45	2	50	15	903767	24
7	4	4	24	42	5	28	38	922360	5	5	44	51	2	43	33	903348	23
8	4	5	26	50	5	24	32	921556	5	6	47	58	2	36	48	902934	22
9	4	6	29	0	5	20	19	920756	5	7	51	5	2	30	0	902534	21
10	4	7	31	12	5	16	0	919971	5	8	54	15	2	23	11	902169	20
11	4	8	33	26	5	11	34	919201	5	9	57	25	2	16	21	901811	19
12	4	9	35	44	5	7	3	918394	5	11	0	38	2	9	31	901472	18
13	4	10	38	6	5	2	25	917642	5	12	3	50	2	2	36	901151	17
14	4	11	40	28	5	57	42	916901	5	13	7	4	1	55	39	900864	16
15	4	12	42	54	4	52	52	916157	5	14	10	17	1	48	36	900580	15
16	4	13	45	24	4	47	57	915417	5	15	13	34	1	41	30	900308	14
17	4	14	47	54	4	42	54	914700	5	16	16	50	1	34	21	900061	13
18	4	15	50	27	4	37	44	914002	5	17	20	7	1	27	10	899838	12
19	4	16	53	2	4	32	31	913311	5	18	23	24	1	20	1	899635	11
20	4	17	55	39	4	27	12	912632	5	19	26	41	1	12	51	899445	10
21	4	18	58	20	4	21	45	911953	5	20	29	59	1	5	39	899260	9
22	4	20	1	1	4	16	14	911302	5	21	33	17	0	58	26	899099	8
23	4	21	3	44	4	10	37	910677	5	22	36	36	0	51	12	898959	7
24	4	22	6	29	4	4	52	910064	5	23	39	57	0	43	57	898837	6
25	4	23	9	16	3	59	4	909457	5	24	43	18	0	36	42	898728	5
26	4	24	12	4	3	53	12	908861	5	25	46	38	0	29	26	898642	4
27	4	25	14	55	3	47	15	908272	5	26	49	59	0	22	7	898573	3
28	4	26	17	48	3	41	12	907717	5	27	53	19	0	14	47	898527	2
29	4	27	20	42	3	35	4	907181	5	28	56	39	0	7	24	898494	1
30	4	28	23	38	3	28	52	906637	6	0	0	0	0	0	0	898490	0
Anomal.					Adde.								Adde.				Anom.
	Signe 7.								Signe 6.								

A Table of the Inclination, Reduction, and Curtation, of SATURN.

Argument of Latitude,

Nor Sou De-gres	Signe. 0. Signe. 6.				Signe. 1. Signe. 7.				Signe. 2. Signe. 8.				Sig. 0 Sig. 6		Sig. 1 Sig. 7		Sig. 2 Sig. 8		Si. 0 Si. 6	Si. 1 Si. 7	Si. 2 Si. 8	Degrees
	Inclination.				Inclination.				Inclination.				Reduction.						Curtation.			
	Parts	D	'	"	Parts	D	'	"	Parts	D	'	"	'	"	'	"	'	"	Part	Part	Part	
0	0	0	0	0	20840	1	15	15	36096	2	10	19	0	0	1	27	1	27	0	230	684	30
1	727	0	2	37	21467	1	17	31	36454	2	11	37	0	4	1	29	1	25	0	243	698	29
2	1454	0	5	15	22087	1	19	46	36801	2	12	53	0	8	1	30	1	23	1	256	711	28
3	2181	0	7	52	22701	1	21	59	37137	2	14	6	0	11	1	32	1	21	2	270	723	27
4	2907	0	10	30	23307	1	24	10	37462	2	15	16	0	15	1	34	1	19	4	285	736	26
5	3633	0	13	6	23907	1	26	18	37775	2	16	23	0	18	1	35	1	17	6	300	748	25
6	4357	0	15	44	24499	1	28	26	38077	2	17	28	0	22	1	36	1	15	9	315	760	24
7	5080	0	18	21	25084	1	30	32	38367	2	18	31	0	25	1	37	1	13	13	330	772	23
8	5801	0	20	57	25661	1	32	37	38645	2	19	32	0	28	1	48	1	11	18	346	784	22
9	6520	0	23	33	26230	1	34	41	38912	2	20	30	0	32	1	39	1	8	23	361	796	21
10	7238	0	26	8	26792	1	36	43	39166	2	21	25	0	35	1	39	1	5	28	377	807	20
11	7953	0	28	42	27345	1	38	44	39409	2	22	18	0	38	1	40	1	3	34	393	817	19
12	8666	0	31	16	27890	1	40	42	39640	2	23	8	0	42	1	40	1	0	40	409	826	18
13	9376	0	33	50	28426	1	42	38	39858	2	23	55	0	45	1	41	0	57	47	425	835	17
14	10083	0	36	23	28954	1	44	32	40065	2	24	40	0	48	1	41	0	54	54	441	843	16
15	10788	0	38	56	29422	1	46	24	40260	2	25	22	0	51	1	41	0	51	63	457	851	15
16	11489	0	41	27	29982	1	48	15	40442	2	26	1	0	54	1	41	0	48	71	473	859	14
17	12186	0	43	59	30483	1	50	3	40612	2	26	38	0	57	1	40	0	45	79	489	867	13
18	12880	0	46	29	30981	1	51	49	40769	2	27	12	1	0	1	40	0	42	88	505	874	12
19	13570	0	48	59	31456	1	53	34	40914	2	27	44	1	3	1	39	0	38	97	521	880	11
20	14255	0	51	27	31929	1	55	16	41047	2	28	13	1	5	1	39	0	35	107	537	886	10
21	14937	0	53	55	32391	1	56	56	41167	2	28	40	1	8	1	38	0	32	118	553	891	9
22	15614	0	56	22	32844	1	58	34	41274	2	29	3	1	11	1	38	0	28	130	568	896	8
23	16286	0	58	48	33287	2	0	10	41369	2	29	24	1	13	1	37	0	25	142	584	901	7
24	16953	1	1	11	33720	2	1	44	41451	2	29	41	1	15	1	36	0	22	154	595	905	6
25	17615	1	3	35	34142	2	3	16	41521	2	29	55	1	17	1	35	0	18	166	614	908	5
26	18271	1	5	57	34554	2	4	45	41579	2	30	9	1	19	1	34	0	15	178	629	910	4
27	18923	1	8	18	34956	2	6	13	41623	2	30	19	1	21	1	32	0	11	191	644	912	3
28	19568	1	10	38	35347	2	7	37	41654	2	30	26	1	23	1	30	0	8	203	658	913	2
29	20207	1	12	57	35727	2	8	59	41673	2	30	29	1	25	1	29	0	4	216	671	914	1
30	20840	1	15	15	36096	2	10	19	41680	2	30	30	1	27	1	27	0	0	230	684	914	0
Nor Sou	Signe. 11. Signe. 5.				Signe. 10. Signe. 4.				Signe. 9. Signe. 3.				Sig. 5 Si. 11		Sig. 4 Si. 10		Sig. 3 Sig. 9		Si. 5 S. 11	Si. 4 S. 10	Si. 3 Si. 9	Argu.

Argument of Latitude

A Table of the Middle Motion of JUPITER, for Yeares of the Christian Æra, according to the Julian Account.

Yeares of Christ.	Longitude of ♃				Aphelion of ♃				Nod. Ascen. ♃			
	S	D	′	″	S	D	′	″	S	D	′	″
001	5	29	49	47	5	11	11	40	2	29	39	15
101	11	06	08	07	5	12	51	50	3	00	00	55
201	4	12	26	28	5	14	32	00	3	00	22	35
301	9	18	44	48	5	16	12	10	3	00	44	16
401	2	25	03	08	5	17	52	20	3	01	05	56
501	8	01	21	28	5	19	32	30	3	01	27	36
601	1	07	39	49	5	21	12	40	3	01	49	17
701	6	13	58	09	5	22	52	50	3	02	10	57
801	11	20	16	29	5	24	33	00	3	02	32	37
901	4	26	34	49	5	26	13	10	3	02	54	18
1001	10	2	53	10	5	27	53	20	3	03	15	58
1101	3	9	11	30	5	29	33	30	3	03	37	38
1201	8	15	29	50	6	01	13	40	3	03	59	16
1301	1	21	48	10	6	02	53	50	3	04	20	59
1401	6	28	6	31	6	04	34	00	3	04	42	39
1501	0	4	24	51	6	06	14	10	3	05	04	20
1601	5	10	43	11	6	07	54	20	3	05	26	00
1701	10	17	1	31	6	09	34	30	3	05	47	40
1801	3	23	19	52	6	11	14	40	3	06	09	21
1901	8	29	38	12	6	12	54	50	3	06	31	01
2001	2	5	56	32	6	14	35	00	3	06	52	41
2101	7	12	14	52	6	16	15	10	3	07	14	22
2201	0	18	33	13	6	17	55	20	3	07	36	02
2301	5	24	51	33	6	19	35	30	3	07	57	42
2401	11	1	9	53	6	21	15	40	3	08	19	23
2501	4	7	28	13	6	22	55	50	3	08	41	03
2601	9	13	46	34	6	24	36	00	3	09	02	43
2701	2	20	4	54	6	26	16	10	3	09	24	24
2801	7	26	23	14	6	27	56	20	3	09	46	04
2901	1	2	41	34	6	29	36	30	3	10	07	44
3001	6	8	59	55	7	01	16	40	3	10	29	25
4001	10	12	3	18	7	17	58	20	3	14	06	09
5001	2	15	6	40	8	04	40	00	3	17	42	53
6001	6	18	10	3	8	21	21	40	3	21	19	37
7001	10	21	13	25	9	08	03	20	3	24	56	21
8001	2	24	16	48	9	24	45	00	3	28	33	05

Months	Com. Y Lon. ♃			Biss. Year Longi. ♃			Aphe- ♃			No. As. ♃		
	D	′	″	D	′	″	D	′	″	D	′	″
Januar.	0	0	0	00	00	00	0	0	00	0	0	0
Febru.	0	02	0	02	34	37	0	0	05	0	0	1
March	0	04	0	04	59	16	0	0	11	0	0	2
Aprill	0	07	0	07	33	53	0	0	16	0	0	3
May	0	09	0	10	03	31	0	0	21	0	0	4
June	0	12	0	12	38	08	0	0	26	0	0	5
July	0	15	0	15	07	46	0	0	31	0	0	6
August	0	17	0	17	42	23	0	0	37	0	0	7
Septēb	0	20	0	20	17	01	0	0	42	0	0	8
Octob.	0	22	0	22	46	39	0	0	40	0	0	9
Nove.	0	25	0	25	21	16	0	0	51	0	0	10
Decem	0	27	0	27	50	54	0	0	56	0	0	11

A Table of the Annuall Motion of ♃, for supplying the intermediate Yeares of the former Table.

	Years included.	Longitude of ♃				Aphelion of ♃				No. Asc. ♃		
		S	D	′	″	S	D	′	″	D	′	″
	80	8	29	02	40	0	1	20	8	0	17	20
	60	0	21	47	00	0	1	00	6	0	13	0
	40	4	14	31	20	0	0	40	4	0	08	40
	20	8	07	15	40	0	0	20	2	0	04	20
	1	1	00	20	32	0	0	01	0	0	0	13
	2	2	00	41	04	0	0	02	0	0	0	22
	3	3	01	01	36	0	0	03	0	0	0	39
B	4	4	01	27	08	0	0	04	0	0	0	52
	5	5	01	47	40	0	0	05	0	0	1	5
	6	6	02	08	12	0	0	06	0	0	1	18
	7	7	02	28	44	0	0	07	1	0	1	31
B	8	8	02	54	16	0	0	08	1	0	1	44
	9	9	03	14	48	0	0	09	1	0	1	57
	10	10	03	35	20	0	0	10	1	0	2	10
	11	11	03	55	53	0	0	11	1	0	2	23
B	12	0	04	21	24	0	0	12	1	0	2	36
	13	1	04	41	56	0	0	13	1	0	2	49
	14	2	05	02	28	0	0	14	1	0	3	2
	15	3	05	23	01	0	0	15	1	0	3	15
B	16	4	05	48	32	0	0	16	1	0	3	28
	17	5	06	09	04	0	0	17	2	0	3	41
	18	6	06	29	37	0	0	18	2	0	3	54
	19	7	06	50	09	0	0	19	2	0	4	7
B	20	8	07	15	40	0	0	20	2	0	4	20

Dayes.	Longit. of ♃			H	Lon. ♃		H	Lonit. ♃	
	D	′	″	′	′	″	′	′	″
1	0	4	59	1	0	12	31	6	27
2	0	9	59	2	0	25	32	6	40
3	0	14	58	3	0	37	33	6	52
4	0	19	57	4	0	50	34	7	5
5	0	24	56	5	1	2	35	7	17
6	0	29	56	6	1	15	36	7	30
7	0	34	55	7	1	27	37	7	42
8	0	39	54	8	1	40	38	7	55
9	0	44	53	9	1	52	39	8	7
10	0	49	53	10	2	5	40	8	20
11	0	54	52	11	2	17	41	8	32
12	0	59	51	12	2	30	42	8	44
13	1	4	50	13	2	42	43	8	57
14	1	9	50	14	2	55	44	9	9
15	1	14	49	15	3	7	45	9	22
16	1	19	48	16	3	20	46	9	34
17	2	24	48	17	3	32	47	9	47
18	1	29	47	18	3	44	48	9	59
19	1	34	46	19	3	57	49	10	12
20	1	39	45	20	4	9	50	10	24
21	1	44	45	21	4	22	51	10	37
22	1	49	44	22	4	34	52	10	50
23	1	54	43	23	4	47	53	11	2
24	1	59	42	24	4	59	54	11	15
25	2	4	42	25	5	12	55	11	27
26	2	9	41	26	5	24	56	11	40
27	2	14	40	17	5	37	57	11	52
28	2	19	39	28	5	50	58	12	5
29	2	24	39	29	6	2	59	12	17
30	2	29	38	30	6	15	60	12	30
31	2	34	37	″	″	‴	″	″	‴

A Table of the absolute Æquation of the first inequality of Jupiter.

Signe 0.

Degrees.	Anomalie co-æquated. S	D	′	″	Æquati. ♃ Substract. D	′	″	Distance of ♃ fro ☉
0	0	0	0	0	0	0	0	547550
1	0	0	57	2	0	5	31	547546
2	0	1	54	4	0	11	1	547535
3	0	2	51	6	0	16	31	547516
4	0	3	48	8	0	22	3	547480
5	0	4	45	10	0	27	33	547458
6	0	5	42	13	0	33	2	547413
7	0	6	39	15	0	38	30	547371
8	0	7	36	18	0	43	59	547318
9	0	8	33	22	0	49	25	547259
10	0	9	30	27	0	54	49	547192
11	0	10	27	32	1	0	15	547119
12	0	11	24	38	1	5	39	547038
13	0	12	21	45	1	11	2	546952
14	0	13	18	53	1	16	23	546863
15	0	14	16	0	1	21	42	546765
16	0	15	13	9	1	27	1	546652
17	0	16	10	20	1	32	17	546537
18	0	17	7	31	1	37	33	546417
19	0	18	4	42	1	42	47	546291
20	0	19	1	55	1	47	59	546158
21	0	19	59	7	1	53	11	546013
22	0	20	56	22	1	58	20	545867
23	0	21	53	38	2	3	29	545713
24	0	22	50	55	2	8	34	545553
25	0	23	48	14	2	13	38	545384
26	0	24	45	35	2	18	38	545211
27	0	25	42	56	2	23	36	545035
28	0	26	40	20	1	28	31	544852
29	0	27	37	42	2	33	25	544661
30	0	28	35	9	2	38	17	544453
Anomal.					*Adde.*			

Signe 11.

Signe 1.

Anomalie co-æquated. S	D	′	″	Æquati. ♃ Substract. D	′	″	Distanc ♃ of ♃ fro ☉	Degrees.
0	28	35	9	2	38	17	544453	30
0	29	32	36	2	43	4	544247	29
1	0	30	6	2	47	49	544043	28
1	1	27	37	2	52	33	543822	27
1	2	25	9	2	57	14	543595	26
1	3	22	44	3	1	53	543364	25
1	4	20	21	3	6	28	543176	24
1	5	18	0	3	11	0	542885	23
1	6	15	40	3	15	28	542639	22
1	7	13	29	3	19	54	542382	21
1	8	11	9	3	24	18	542127	20
1	9	8	56	3	28	36	541864	19
1	10	7	45	3	32	53	541592	18
1	11	4	37	3	37	5	541315	17
1	12	2	30	3	41	14	541033	16
1	13	0	25	3	45	22	540744	15
1	13	58	23	3	49	24	540452	14
1	14	56	23	3	53	21	540157	13
1	15	54	25	3	57	16	539852	12
1	16	52	30	4	1	7	539544	11
1	17	50	36	4	4	54	539232	10
1	18	48	45	4	8	38	538914	9
1	19	46	57	4	12	16	538590	8
1	20	45	11	4	15	52	538260	7
1	21	43	29	4	19	23	537920	6
1	22	41	49	4	22	50	537587	5
1	23	40	11	4	26	12	537240	4
1	24	38	36	4	29	30	536892	3
1	25	37	4	4	32	42	536540	2
1	26	35	34	4	35	51	536182	1
1	27	34	9	4	38	54	635819	0
				Adde.				Anomal.

Signe 10.

A Table of the absolute Æquation of the first inequality of Jupiter.

Signe 2.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♃ Substract D	′	″	Distance of ♃ frō ☉
0	1	27	34	9	4	38	54	535819
1	1	28	22	44	4	41	53	535455
2	1	29	31	25	4	44	49	535080
3	2	0	30	7	4	47	40	534709
4	2	1	28	52	4	50	26	534330
5	2	2	27	39	4	53	7	533947
6	2	3	26	29	4	55	42	533563
7	2	4	25	23	4	58	14	533171
8	2	5	24	20	5	0	41	532783
9	2	6	23	18	5	3	3	532389
10	2	7	22	20	5	5	19	531992
11	2	8	21	25	5	7	31	531592
12	2	9	20	32		9	38	531189
13	2	10	19	44		11	38	530778
14	2	11	18	58		13	35	530365
15	2	12	18	14		15	26	529954
16	2	13	17	34	5	17	11	529542
17	2	14	16	58		18	49	529121
18	2	15	16	24		20	25	528699
19	2	16	15	52		21	56	528274 4
20	2	17	15	26		23	19	527849
21	2	18	15	1	5	24	33	5274[illegible] 25
22	2	19	14	39		25	44	526996
23	2	20	14	20		26	48	526564
24	2	21	14	3		27	48	526132
25	2	22	13	50		28	43	525706
26	2	23	13	40	5	29	30	525271
27	2	24	13	34		30	12	524831
28	2	25	13	31		30	49	524381
29	2	26	13	31		31	19	523967
30	2	27	13	34	5	31	45	523[illegible]
Anomal.					*Adde.*			523530

Signe 9.

Signe 3.

Anomalie co-æquated. S	D	′	″	Æquati. ♃ Substract D	′	″	Distance of ♃ frō ☉	Degrees
2	27	13	34	5	31	45	523530	30
2	28	13	40		32	1	523089	29
2	29	13	49		32	12	522645	28
3	0	14	0		32	18	522202	27
3	1	14	15		32	18	521758	26
3	2	14	34		32	12	521314	25
3	3	14	55	5	32	0	520868	24
3	4	15	19		31	41	520422	23
3	5	15	47		31	17	519977	22
3	6	16	17		30	46	519533	21
3	7	16	50		30	8	519089	20
3	8	17	24	5	29	25	518647	19
3	9	18	4		28	35	518208	18
3	10	18	46		27	38	517[illegible]	17 337
3	11	19	31		26	37	517484	16
3	12	20	19		25	28	516904	15
3	13	21	11	5	24	15	516475	14
3	14	22	4		22	52	516042	13
3	15	23	0		21	25	515606	12
3	16	23	59		19	50	515178	11
3	17	25	1		18	9	514748	10
3	18	26	5	5	16	26	514321	9
3	19	27	13		14	35	513900	8
3	20	28	22		12	34	513479	7
3	21	29	34		10	30	513062	6
3	22	30	50		8	20	512645	5
3	23	32	8	5	6	3	512236	4
3	24	33	29	5	3	41	511826	3
3	25	34	53	5	1	11	511416	2
3	26	36	19	4	58	37	511011	1
3	27	37	46	4	55	57	510611	0
				Adde.				Anomal.

Signe 8.

A Table of the absolute Æquation of the first inequality of Jupiter.

	Signe 4.								Signe 5.								
Degrees.	Anomalie co-æquated.				Æquati. ♃ Substract.			Distance of ♃ from ☉	Anomalie co-æquated.				Æquati. ♃ Substract.			Distance of ♃ from ☉	Degrees.
	S	D	'	"	D	'	"		S	D	'	"	D	'	"		
0	3	27	37	46	4	55	57	510611	4	28	38	47	2	53	59	500773	30
1	3	28	39	16	4	53	11	512114	4	29	41	14	2	48	46	500539	29
2	3	29	40	49	4	50	18	509820	5	0	43	47	2	43	30	590311	28
3	4	0	42	25	4	47	19	509430	5	1	46	19	2	38	11	500092	27
4	4	1	44	3	4	44	14	509043	5	2	48	52	2	32	45	499877	26
5	4	2	45	45	4	41	3	508661	5	3	51	27	2	27	17	499671	25
6	4	3	47	28	4	37	47	508278	5	4	54	2	2	21	47	499474	24
7	4	4	49	13	4	34	25	507903	5	5	56	38	2	16	16	499280	23
8	4	5	51	1	4	30	59	507535	5	6	59	16	2	10	40	499097	22
9	4	6	52	51	4	27	27	507170	5	8	1	54	2	5	2	498924	21
10	4	7	54	44	4	23	50	506809	5	9	4	34	1	59	18	498756	20
11	4	8	56	39	4	20	7	506452	5	10	7	15	1	53	35	498594	19
12	4	9	58	35	4	16	20	506102	5	11	9	56	1	47	49	498444	18
13	4	11	0	33	4	12	26	505754	5	12	12	38	1	42	0	498297	17
14	4	12	2	32	4	8	28	505416	5	13	15	21	1	36	10	498155	16
15	4	13	4	33	4	4	26	505081	5	14	18	4	1	30	19	498024	15
16	4	14	6	38	4	0	19	504751	5	15	20	50	1	24	24	497909	14
17	4	15	8	43	3	56	3	504423	5	16	23	35	1	18	30	497800	13
18	4	16	10	52	3	51	44	504109	5	17	26	20	1	12	34	497690	12
19	4	17	13	2	3	47	20	503779	5	18	29	5	1	6	36	497597	11
20	4	18	15	13	3	42	50	503489	5	19	31	52	1	0	37	497508	10
21	4	19	17	26	3	38	16	503188	5	20	35	39	0	54	36	497428	9
22	4	20	19	42	3	33	37	502893	5	21	37	26	0	48	35	497359	8
23	4	21	22	0	3	28	53	502601	5	22	40	15	0	42	32	497296	7
24	4	22	24	20	3	24	5	502320	5	23	43	4	0	36	30	497241	6
25	4	23	26	40	3	19	13	502048	5	24	45	52	0	30	26	497192	5
26	4	24	29	3	3	14	18	501780	5	25	48	42	0	24	21	497157	4
27	4	25	31	27	3	9	19	501517	5	26	51	32	0	18	16	497128	3
28	4	26	33	53	3	4	17	501262	5	27	54	21	0	12	11	497106	2
29	4	27	36	19	3	59	10	501014	5	28	57	10	0	6	6	497095	1
30	4	28	38	47	3	53	59	500773	6	0	0	0	0	0	0	497090	0
Anomal.	*Adde.*								*Adde.*								Anomal.
	Signe 7.								Signe 6.								

A Table of the Inclination, Reduction, and Curtation, of JUPITER,

Argument of Latitude.

North ⁊ *Signe* 0. South ⁊ *Signe* 6.				*Signe* 1. *Signe* 7.				*Segne* 2. *Signe* 8,				S. 0. S. 6.		S. 1. S. 7.		S. 2. S. 8.		S. 0. S. 6.	S. 1. S. 7.	S. 2. S. 8.	N-ort
Degres	Inclination.			Inclination.				Inclination.				Reduction.						Curtation.			Degres
	Parts	′	″	Parts	D	′	″	Parts	D	′	″	′	″	′	″	′	″	Pa	Part	Part	
0	0	0	0	6212	0	40	55	10760	1	10	52	0	0	0	25	0	25	0	38	110	30
1	219	1	26	6399	0	42	9	10866	1	11	34	0	2	0	26	0	25	0	40	112	29
2	434	2	51	6584	0	43	22	10970	1	12	15	0	3	0	26	0	24	0	42	115	28
3	650	4	17	6767	0	44	34	11068	1	12	55	0	4	0	27	0	24	0	45	117	27
4	867	5	42	6947	0	45	46	11167	1	13	33	0	5	0	27	0	23	0	47	119	26
5	1083	7	8	7126	0	46	58	11260	1	14	10	0	6	0	27	0	23	1	49	121	25
6	1298	8	33	7303	0	48	6	11350	1	14	45	0	7	0	28	0	22	1	52	123	24
7	1514	9	58	7477	0	49	14	11436	1	15	19	0	8	0	28	0	22	2	54	125	23
8	1729	11	23	7649	0	50	23	11519	1	15	52	0	9	0	28	0	21	3	57	127	22
9	1944	12	48	7819	0	51	30	11599	1	16	23	0	10	0	28	0	20	4	59	129	21
10	2157	14	12	7986	0	52	36	11675	1	16	54	0	11	0	29	0	20	5	62	131	20
11	2370	15	37	8151	0	53	41	11747	1	17	23	0	12	0	29	0	19	6	64	132	19
12	2583	17	0	8313	0	54	46	11816	1	17	50	0	13	0	29	0	18	7	67	134	18
13	2795	18	24	8473	0	55	49	11881	1	18	16	0	14	0	29	0	17	8	69	135	17
14	3006	19	48	8630	0	56	52	11943	1	18	40	0	15	0	29	0	16	9	71	136	16
15	3215	21	11	8785	0	57	52	12001	1	19	2	0	15	0	30	0	15	10	74	138	15
16	3424	22	33	8937	0	58	53	12055	1	19	24	0	16	0	29	0	15	12	77	139	14
17	3632	23	56	9086	0	59	52	12103	1	19	44	0	17	0	29	0	14	13	79	140	13
18	3839	25	17	9233	1	0	49	12152	1	20	3	0	18	0	29	0	13	14	81	141	12
19	4045	26	39	9371	1	1	45	12196	1	20	2[illegible]	[illegible]	18	0	29	0	12	16	84	142	11
20	4249	27	59	9517	1	2	41	12235	1	20	3[illegible]	0	19	0	2[illegible]	0	11	17	86	143	10
21	4452	29	20	9655	1	3	36	12271	1	20	49	0	20	0	28	0	10	19	89	144	9
22	4654	30	39	6790	1	4	29	1230	1	21	1	0	21	0	28	0	9	21	91	145	8
23	4854	31	59	9922	1	5	21	12331	2	21	12	0	21	0	28	0	8	23	94	146	7
24	5053	33	17	10056	1	6	12	12359	1	21	22	0	22	0	28	0	7	25	96	147	6
25	5251	34	35	10177	1	7	2	12377	1	21	31	0	23	0	27	0	6	27	99	147	5
26	5446	35	53	10300	1	7	50	12394	1	21	38	0	23	0	27	0	5	29	101	148	4
27	5640	37	9	10420	1	8	37	12407	1	21	43	0	24	0	27	0	4	31	103	148	3
28	5833	38	26	10536	1	9	24	12416	1	21	47	0	24	0	26	0	3	33	106	148	2
29	6023	39	41	10649	1	10	8	12422	1	21	49	0	25	0	26	0	2	36	108	148	1
30	6212	40	55	10760	1	10	52	1242[illegible]	1	21	50	0	25	0	25	0	0	38	110	148	0
North ⁊ *Signe* 5. South ⁊ *Signe* 11				*Signe* 4. *Signe* 10				*Signe* 3. *Signe* 9.				S. 5. S. 11.		S. 4. S. 10.		S. 3. S. 9.		S. 5. S. 11.	S. 4. S. 10.	S. 3. S. 9.	Degre.

Argument of Latitude.

A Table of the Middle Motion of MARS, for Yeares of the Christian Æra, according to the Julian Account.

Yeares of Christ.	Longitude of ♂ S	D	′	″	Aphelion of ♂ S	D	′	″	Nod. Ascen. ♂ S	D	′	″
001	1	10	07	42	3	26	35	57	0	27	20	31
101	3	11	47	33	3	28	37	27	0	28	33	12
201	5	13	27	23	4	00	38	57	0	29	45	54
301	7	15	07	13	4	02	40	27	1	00	58	35
401	9	16	47	03	4	04	41	58	1	02	11	16
501	11	18	26	53	4	06	43	28	1	03	23	57
601	1	20	06	43	4	08	44	58	1	04	36	38
701	3	21	46	34	4	10	46	28	1	05	49	19
801	5	23	26	24	4	12	47	58	1	07	02	01
901	7	25	06	14	4	14	49	29	1	08	14	42
1001	9	26	46	04	4	16	50	59	1	09	27	23
1101	11	28	25	54	4	18	52	29	1	10	40	04
1201	2	00	05	44	4	20	53	59	1	11	52	45
1301	4	01	45	35	4	22	55	29	1	13	05	26
1401	6	03	25	25	4	24	57	00	1	14	18	08
1501	8	05	05	15	4	26	58	30	1	15	30	49
1601	10	06	45	05	4	29	00	00	1	16	43	30
1701	0	08	24	55	5	01	01	30	1	17	56	11
1801	2	10	04	45	5	03	03	00	1	19	08	52
1901	4	11	44	35	5	05	04	31	1	20	21	33
2001	6	13	24	26	5	07	06	01	1	21	34	15
2101	8	15	04	16	5	09	07	31	1	22	46	56
2201	10	16	44	06	5	11	09	01	1	23	59	37
2301	0	18	23	56	5	13	10	31	1	25	12	18
2401	2	20	03	46	5	15	12	02	1	26	24	59
2501	4	21	43	36	5	17	13	32	1	27	37	40
2601	6	23	23	27	5	19	15	02	1	28	50	22
2701	8	25	03	17	5	21	16	32	2	00	03	03
2801	10	26	43	07	5	23	18	02	2	01	15	44
2901	0	28	22	57	5	25	19	33	2	02	28	25
3001	3	00	02	47	5	27	21	03	2	03	41	06
4001	11	16	41	09	6	17	36	05	2	15	47	57
5001	8	03	19	31	7	07	51	07	2	27	54	48
6001	4	19	57	52	7	28	06	09	3	10	01	39
7001	1	06	36	14	8	18	21	11	3	22	08	30
8001	9	23	14	36	9	08	36	13	4	04	15	21

Months	Com. Year Lon. ♂ S	D	′	″	Biss. Year Longi. ♂ S	D	′	″	Aph. ♂ ′	″	N. Af ♂ ′	″
Januar.	0	00	00	00	0	00	00	00	0	00	0	00
Febru.	0	16	14	46	0	16	14	46	0	06	0	03
March	1	00	55	13	1	01	26	19	0	12	0	7
Aprill	1	17	09	59	1	17	41	26	0	18	0	10
May	2	02	53	18	2	03	24	45	0	24	0	14
June	2	19	08	05	2	19	39	32	0	31	0	17
July	3	04	51	24	3	05	22	50	0	37	0	21
August	3	21	06	11	3	21	37	37	0	43	0	25
Septem.	4	07	20	57	4	07	52	23	0	49	0	28
Octob.	4	23	04	16	4	23	35	42	0	55	0	32
Nove.	5	09	19	03	5	09	50	29	1	01	0	36
Decem	5	25	02	22	5	25	33	48	1	07	0	39

A Table of the Annuall Motion of ♂ for supplying of the intermediate Years of the former Table.

	Years included.	Longitude of ♂ S	D	′	″	Aphelion of ♂ S	D	′	″	Node Asc. ♂ S	D	′	″
	80	6	13	19	52	0	1	37	12	0	0	58	08
	60	10	24	59	54	0	1	12	54	0	0	43	36
	40	3	06	39	56	0	0	48	36	0	0	29	04
	20	7	18	19	58	0	0	24	18	0	0	14	32
	1	6	11	17	08	0	0	01	13	0	0	00	43
	2	0	22	34	16	0	0	01	26	0	0	01	27
	3	7	3	51	25	0	0	03	38	0	0	02	11
B	4	1	15	40	00	0	0	04	52	0	0	02	55
	5	7	26	57	07	0	0	06	05	0	0	03	38
	6	2	08	14	16	0	0	07	17	0	0	04	22
	7	8	19	31	23	0	0	08	30	0	0	05	06
B	8	3	01	20	00	0	0	09	43	0	0	05	49
	9	9	12	37	08	0	0	10	56	0	0	06	33
	10	3	23	54	16	0	0	12	09	0	0	07	16
	11	10	05	11	24	0	0	13	22	0	0	08	00
B	12	4	16	59	59	0	0	14	35	0	0	08	43
	13	10	28	17	07	0	0	15	48	0	0	09	27
	14	5	9	34	15	0	0	17	01	0	0	10	11
	15	11	20	51	23	0	0	18	14	0	0	10	54
B	16	6	02	39	51	0	0	19	26	0	0	11	38
	17	0	13	57	7	0	0	20	39	0	0	12	21
	18	6	25	14	15	0	0	21	52	0	0	13	05
	19	1	06	31	23	0	0	23	05	0	0	13	48
B	20	7	18	19	58	0	0	24	18	0	0	14	32

Days.	Longit. of ♂ D	′	″	H ′	Lon. of ♂ ′	″	H ′	Long. ♂ D	′	″
1	0	31	27	1	1	19	31	0	40	37
2	1	02	53	2	2	37	32	0	41	56
3	1	34	20	3	3	56	33	0	43	15
4	2	05	46	4	5	15	34	0	44	33
5	2	37	16	5	6	33	35	0	45	52
6	3	8	40	6	7	52	36	0	47	10
7	3	40	06	7	9	10	37	0	48	29
8	4	11	33	8	10	29	38	0	49	48
9	4	43	00	9	11	48	39	0	51	6
10	5	14	27	10	13	6	40	0	52	25
11	5	45	53	11	14	25	41	0	53	43
12	6	17	20	12	15	43	42	0	55	2
13	6	48	46	13	17	2	43	0	56	21
14	7	20	14	14	18	21	44	0	57	39
15	7	51	40	15	19	39	45	0	58	58
16	8	23	16	16	20	58	46	1	0	16
17	8	54	33	17	21	[illegible]	47	1	1	35
18	9	26	0	18	23	35	48	1	2	54
19	9	57	27	19	24	54	49	1	4	12
20	10	28	53	20	26	12	50	1	5	31
21	11	00	20	21	27	31	51	1	6	49
22	11	31	46	22	28	49	52	1	8	8
23	12	03	13	23	30	8	53	1	10	27
24	12	34	40	24	31	27	54	1	11	45
25	13	06	6	25	32	45	55	1	13	4
26	13	37	33	26	34	4	56	1	14	22
27	14	09	0	27	35	22	57	1	15	41
28	14	40	27	28	36	41	58	1	17	0
29	15	11	5	29	38	0	59	1	18	19
30	15	43	20	30	39	18	60	1	19	37
31	16	14	46							

A Table of the absolute Æquation of the first inequality of Mars.

	Signe 0.								Signe 1.								
Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♂ Substract. D	′	″	Distance of ♂ from ☉.	Anomalie co-æquated. S	D	′	″	Æquati. ♂ Substract. D	′	″	Distance of ♂ from ☉.	Degrees.
0	0	0	0	0	0	0	0	166605	0	27	12	0	4	48	17	164977	30
1	0	0	54	6	0	10	4	166602	0	28	7	2	4	57	6	164867	29
2	0	1	48	13	0	20	8	166597	0	29	2	6	5	5	51	164752	28
3	0	2	42	21	0	30	11	166585	0	29	57	13	5	14	32	164636	27
4	0	3	36	28	0	40	14	166572	1	0	52	25	5	23	8	164518	26
5	0	4	30	35	0	50	16	166557	1	1	47	39	5	31	39	164398	25
6	0	5	24	43	1	0	16	166537	1	2	42	58	5	40	7	164274	24
7	0	6	18	52	1	10	14	166513	1	3	38	21	5	48	31	164144	23
8	0	7	13	1	1	20	10	166487	1	4	33	49	5	56	50	164012	22
9	0	8	7	11	1	30	4	166456	1	5	29	20	6	5	4	163875	21
10	0	9	1	23	1	39	57	166423	1	6	24	55	6	13	12	163738	20
11	0	9	55	46	1	49	49	166384	1	7	20	36	6	21	14	163597	19
12	0	10	49	50	1	59	38	166344	1	8	16	20	6	29	13	163452	18
13	0	11	44	6	2	9	25	166299	1	9	12	8	6	37	8	163305	17
14	0	12	38	24	2	19	9	166248	1	10	7	59	6	45	0	163144	16
15	0	13	32	43	2	28	50	166194	1	11	3	55	6	52	44	163000	15
16	0	14	27	3	2	38	29	166139	1	11	59	54	7	0	19	162841	14
17	0	15	21	25	2	48	5	166088	1	12	55	57	7	7	47	162681	13
18	0	16	15	50	2	57	39	166014	1	13	52	0	7	15	10	162518	12
19	0	17	10	17	3	7	10	165948	1	14	48	28	7	22	28	162352	11
20	0	18	4	44	3	16	37	165877	1	15	44	57	7	29	42	162181	10
21	0	18	59	18	3	26	2	165803	1	16	41	29	7	36	50	162009	9
22	0	19	53	51	3	35	25	165725	1	17	38	7	7	43	52	161834	8
23	0	20	48	27	3	44	45	165646	1	18	34	50	7	50	47	161655	7
24	0	21	43	5	3	54	1	165561	1	19	31	38	7	57	36	161477	6
25	0	22	37	49	3	3	12	165473	1	20	28	28	8	4	19	161295	5
26	0	23	32	34	4	12	19	165380	1	21	25	21	8	10	57	161108	4
27	0	24	27	21	4	21	24	165283	1	22	22	20	8	17	25	160921	3
28	0	25	22	12	4	30	25	165184	1	23	19	23	8	23	46	160730	2
29	0	26	17	4	4	39	23	165081	1	24	16	32	8	29	59	160536	1
30	0	27	12	0	4	48	17	164977	1	25	13	46	8	36	7	160340	0
Anomal.					Adde.								Adde.				Anomal.
	Signe 11.								Signe 10.								

A Table of the absolute Æquation of the first inequality of Mars.

	Signe 2.								Signe 3.								
Degrees	Anomalie co-æquated. S	D	'	"	Æquati. ♂ Substract. D	'	"	Distance of ♂ from ☉.	Anomalie co-æquated. S	D	'	"	Æquati. ♂ Substract. D	'	"	Distance of ♂ from ☉.	Degrees.
0	1	25	13	46	8	36	7	16034	2	24	38	42	10	33	15	153550	30
1	1	26	11	8	8	42	7	160143	2	25	39	0	10	34	33	153304	29
2	1	27	8	37	8	48	0	15[illegible]942	2	26	39	37	10	35	38	153057	28
3	1	28	16	11	8	53	45	159738	2	27	40	14	10	36	32	152810	27
4	1	29	3	51	8	59	22	159533	2	28	40	56	10	37	15	152562	26
5	2	0	1	37	9	4	52	159326	2	29	41	44	19	37	45	152316	25
6	2	0	59	28	9	10	14	159114	3	0	42	38	10	38	4	152070	24
7	2	1	57	27	9	15	27	158[illegible]02	3	1	43	38	10	38	15	151818	23
8	2	2	55	32	9	20	31	158688	3	2	44	44	10	38	11	151569	22
9	2	3	53	43	9	25	30	158473	3	3	45	56	10	37	56	151318	21
10	2	4	51	59	9	30	20	158253	3	4	47	14	10	37	29	151069	20
11	2	5	50	19	9	35	0	158032	3	5	48	36	10	36	46	150819	19
12	2	6	48	46	9	39	32	157816	3	6	50	4	10	35	50	150568	18
13	2	7	47	21	9	43	55	157585	3	7	51	38	10	34	42	150318	17
14	2	8	46	3	9	48	9	157359	3	8	53	18	10	33	23	150070	16
15	2	9	44	49	9	52	13	157130	3	9	55	4	10	31	50	149822	15
16	2	10	43	40	9	56	8	156899	3	10	56	54	10	30	7	149577	14
17	2	11	42	39	9	59	53	156669	3	11	58	49	10	28	10	149331	13
18	2	12	41	43	10	3	28	156436	3	13	0	50	10	25	58	149085	12
19	2	13	40	55	10	6	53	156206	3	14	2	57	10	23	34	148841	11
20	2	14	40	13	10	10	9	155970	3	15	5	10	10	20	58	148599	10
21	2	15	39	36	10	13	15	155732	3	16	7	26	10	18	8	148357	9
22	2	16	39	6	10	16	12	155491	3	17	9	48	10	15	7	148116	8
23	2	17	38	41	10	18	57	155252	3	18	12	15	10	11	52	147876	7
24	2	18	38	22	10	21	32	155[illegible]11	3	19	14	47	10	8	24	147636	6
25	2	19	38	11	10	23	55	154773	3	20	17	24	10	4	41	147397	5
26	2	20	38	5	10	26	9	154529	3	21	20	5	10	0	45	147164	4
27	2	21	38	6	10	28	12	154284	3	22	22	50	9	56	38	14693[illegible]	3
28	2	22	38	12	10	30	3	154038	3	23	25	41	9	52	17	146697	2
29	2	23	38	23	10	31	45	153793	3	24	28	36	9	47	44	146459	1
30	2	24	38	42	10	33	15	153550	3	25	31	34	9	42	56	146227	0
Anomal.	Adde. Signe 9.								Adde. Signe 8.								Anomal.

A Table of the absolute Æquation of the first inequality of Mars.

Degrees	Signe 4. Anomalie co-æquated. S	D	′	″	Æquati. ♂ Substract. D	′	″	Distance of ♂ from ☉.	Signe 5. Anomalie co-æquated. S	D	′	″	Æquati. ♂ Substract. D	′	″	Distance of ♂ from ☉.	Degrees
0	3	25	31	34	9	42	56	146227	4	27	29	56	5	48	26	140543	30
1	3	26	34	37	9	37	56	145996	4	28	34	36	5	38	1	140407	29
2	3	27	37	45	9	32	43	145771	4	29	39	14	5	27	30	140275	28
3	3	28	40	58	9	27	19	145549	5	0	44	2	5	16	52	140145	27
4	3	29	44	16	9	21	42	145329	5	1	48	49	4	6	5	140021	26
5	4	0	47	39	9	15	52	145106	5	2	53	38	4	55	11	139902	25
6	4	1	51	4	9	9	49	144887	5	3	58	28	4	44	11	139786	24
7	4	2	54	31	9	3	33	144672	5	5	3	20	4	33	5	139676	23
8	4	3	58	3	8	57	6	144459	5	6	8	12	4	21	55	139568	22
9	4	5	1	39	8	50	26	144249	5	7	13	7	4	10	39	139465	21
10	4	6	5	21	8	43	36	144040	5	8	18	1	3	59	17	139366	20
11	4	7	9	6	8	36	33	143834	5	9	23	1	3	47	47	139272	19
12	4	8	12	55	8	29	19	143632	5	10	28	0	3	36	11	139184	18
13	4	9	16	45	8	21	53	143431	5	11	32	59	3	24	34	139099	17
14	4	10	20	39	8	14	15	143235	5	12	39	0	3	12	52	139020	16
15	4	11	24	37	8	6	25	143042	5	13	43	2	3	1	4	138945	15
16	4	12	28	39	7	58	25	142851	5	14	48	6	2	49	14	138875	14
17	4	13	32	45	7	50	12	142662	5	15	53	10	2	37	20	138809	13
18	4	14	36	51	7	41	50	142477	5	16	58	16	2	25	22	138747	12
19	4	15	41	0	7	33	16	142297	5	18	3	22	2	13	22	138692	11
20	4	16	45	13	7	24	32	142118	5	19	8	27	2	1	22	138641	10
21	4	17	49	29	7	15	37	141943	5	20	13	34	1	49	22	138598	9
22	4	18	53	49	7	6	34	141773	5	21	18	43	1	37	17	138564	8
23	4	19	58	11	6	57	22	141605	5	22	23	52	1	25	9	138532	7
24	4	21	2	39	6	47	57	141444	5	23	29	1	1	13	0	138506	6
25	4	22	7	4	6	38	23	141284	5	24	34	10	1	0	50	138484	5
26	4	23	11	33	6	28	42	141127	5	25	39	20	0	48	40	138465	4
27	4	24	16	3	6	18	51	140975	5	26	44	30	0	36	30	138448	3
28	4	25	20	39	6	8	51	140826	5	27	49	39	0	24	21	138429	2
29	4	26	25	17	5	58	42	140684	5	28	54	49	0	12	11	138412	1
30	4	27	29	56	5	48	26	140543	6	0	0	0	0	0	0	138395	0
Anomal.	Signe 7.				Adde.				Signe 6.				Adde.				Anomal.

Tabula Æquationis *Martis Tychonica*.

Degrees	Signe 0. Substract.			Signe 1. Substract.			Signe 2 Substract.			Signe 3. Substract.			Signe 4 Substract.			Signe 5 Substract.			Degrees
	D	′	″	D	′	″	D	′	″	D	′	″	D	′	″	D	′	″	
0	0	0	0	4	48	44	8	38	52	10	32	46	9	41	54	5	52	51	30
1	0	9	57	4	57	37	8	45	47	10	33	55	9	37	6	5	42	31	29
2	0	19	54	5	6	30	8	50	41	10	34	57	9	32	3	5	32	3	28
3	0	29	50	5	15	20	8	56	24	10	35	43	9	26	50	5	21	27	27
4	0	39	46	5	24	4	9	2	4	10	36	20	9	21	22	5	10	44	26
5	0	49	43	5	32	44	9	7	28	10	36	43	9	15	45	4	59	28	25
6	0	59	39	5	41	15	9	12	46	10	36	57	9	10	2	4	48	55	24
7	1	9	34	5	49	47	9	17	54	10	36	57	9	3	43	4	37	50	23
8	1	19	27	5	58	16	9	22	49	10	36	51	8	57	27	4	26	36	22
9	1	29	19	6	6	43	9	27	45	10	36	43	8	51	3	4	15	19	21
10	1	39	10	6	15	1	9	32	28	10	35	55	8	44	26	4	3	52	20
11	1	49	0	6	23	9	9	37	2	10	34	56	8	37	34	3	52	20	19
12	1	58	49	6	31	13	9	41	26	10	33	56	8	30	27	3	40	41	18
13	2	8	37	6	39	10	9	45	41	10	32	52	8	23	19	3	28	58	17
14	2	18	22	6	47	4	9	49	47	10	31	33	8	15	54	3	17	8	16
15	2	28	4	6	54	50	9	53	42	10	30	1	8	8	8	3	5	15	15
16	2	37	45	7	2	30	9	57	38	10	28	16	8	0	19	2	53	13	14
17	2	47	26	7	10	5	10	1	18	10	26	22	7	52	21	2	41	13	13
18	2	57	2	7	17	31	10	4	43	10	24	13	7	44	10	2	29	7	12
19	3	6	37	7	25	8	10	8	0	10	21	50	7	35	51	2	16	57	11
20	3	16	8	7	32	12	10	11	8	10	19	16	7	28	46	2	4	42	10
21	3	25	36	7	39	22	10	14	6	10	16	28	7	18	39	1	52	23	9
22	3	35	55	7	46	25	10	16	54	10	13	28	7	9	48	1	40	0	8
23	3	44	28	7	53	28	10	19	29	10	10	43	7	0	47	1	27	34	7
24	3	53	50	8	0	28	10	21	58	10	6	54	6	51	36	1	15	17	6
25	4	3	7	8	7	19	10	24	11	10	3	17	6	42	14	1	2	40	5
26	4	12	24	8	13	42	10	26	16	9	59	15	6	32	41	0	50	11	4
27	4	21	36	8	20	11	10	28	10	9	55	12	6	23	2	0	37	39	3
28	4	30	21	8	26	32	10	29	53	9	50	59	6	13	12	0	25	6	2
29	4	39	43	8	32	36	10	31	25	9	46	33	6	3	9	0	12	34	1
30	4	48	44	8	38	52	10	32	46	9	41	56	5	52	51	0	0	0	0
Ano	Adde, Signe 11			Adde. Signe 10			Adde Signe 9			Adde Signe 8			Adde Signe 7			Adde Signe 6			Ano

Let it not seem strange to any, that I have added this Table of the Æquation of the first Inæquality of ♂, having before inserted a Table agreeing to my own Observations and Hypothesis (which by many vigilant Observations, I have always found to point out the place of ♂ most accurately, as well in his acronicall positures, as at other times) but because to some it may perhaps be thought, [redacted] not altogether consentaneous to some few of *Tycho's* Observations (for my part, I much suspect the verity of them, because other Observations made since his time, in the same Achronicall-Phases seem to contradict) I have for their satisfaction composed this latter, wherein I have not digressed from the Hypothesis of the third Book, onely have varied from the Doctrine there delivered, in finding the Excentrique Æquation, as I shall demonstrate in my intended Epitomie, where happily I may shew the Composition thereof. But as for the Anomaly co-æquate, and distance of ♂ from the Sun, they will co-incidere with the former Table of the Æquation of ♂, which is composed by my own Observations, according to the Doctrine delivered in the third Book, as is said above.

A Table of the Inclination, Reduction, and Curtation, of MARS.

Argument of Latitude.

	North Signe 0. South Signe 6.			Signe 1. Signe 7.				Signe 2. Signe 8.				S. 0. S. 6.		S. 1. S. 7.		S. 2. S. 8.		S.0 S.6	S. 1. S. 7.	S.2. S.8.	North
Degrees	Inclination.			Inclination.				Inclination.				Reduction.						Curtation.			Degrees
	Parts.	′	″	Parts	D	′	″	Parts	D	′	″	′	″	′	″	′	″	Pa	Part	Part	
0	0	0	0	2458	0	55	32	4257	1	36	11	0	0	0	47	0	47	0	20	60	30
1	86	1	56	2532	0	57	11	4300	1	37	8	0	1	0	48	0	46	0	21	61	29
2	172	3	53	2605	0	58	50	4341	1	38	3	0	3	0	48	0	45	0	22	62	28
3	257	5	48	2678	1	0	27	4380	1	38	58	0	5	0	49	0	44	0	23	64	27
4	343	7	44	2749	1	2	4	4419	1	39	50	0	7	0	49	0	43	0	25	65	26
5	428	9	40	2820	1	3	40	4456	1	40	40	0	9	0	49	0	42	1	26	66	25
6	514	11	36	2890	1	5	15	4491	1	41	29	0	11	0	50	0	41	1	27	67	24
7	599	13	32	2959	1	6	48	4525	1	42	15	0	13	0	50	0	39	1	29	68	23
8	684	15	27	3027	1	8	21	4558	1	42	59	0	15	0	51	0	38	2	30	69	22
9	769	17	22	3094	1	9	52	4589	1	43	42	0	16	0	51	0	37	2	31	70	21
10	854	19	17	3160	1	11	23	4619	1	44	22	0	18	0	52	0	36	3	33	71	20
11	938	21	12	3225	1	12	52	4648	1	45	0	0	20	0	52	0	34	3	34	72	19
12	1022	23	6	3289	1	14	20	4675	1	45	37	0	22	0	52	0	33	4	36	72	18
13	1106	24	59	3353	1	15	46	4701	1	46	13	0	24	0	52	0	32	4	37	73	17
14	1189	26	52	3415	1	17	10	4726	1	46	46	0	26	0	53	0	30	5	38	74	16
15	1272	28	45	3476	1	18	34	4748	1	47	17	0	28	0	53	0	28	5	40	75	15
16	1355	30	36	3536	1	19	55	4770	1	47	46	0	30	0	53	0	26	6	42	75	14
17	1418	32	28	3595	1	21	14	4790	1	48	13	0	32	0	53	0	24	7	43	76	13
18	1519	34	19	3653	1	22	32	4809	1	48	39	0	33	0	52	0	22	8	44	77	12
19	1600	36	10	3710	1	23	50	4826	1	49	2	0	34	0	52	0	20	8	46	77	11
20	1681	37	59	3766	1	25	5	4841	1	49	23	0	36	0	52	0	18	9	47	78	10
21	1762	39	48	3820	1	26	19	485	1	49	42	0	37	0	51	0	16	10	49	78	9
22	1842	41	36	3874	1	27	31	4868	1	49	59	0	38	0	51	0	15	11	50	78	8
23	1921	43	23	3926	1	28	42	4879		50	14	0	[illegible]	0	50	0	13	12	51	79	7
24	2000	45	10	3977	1	29	51	4888	1	50	27	0	41	0	50	0	11	13	53	79	6
25	2078	46	55	4027	1	30	59	4897	1	50	38	0	42	0	49	0	9	14	54	79	5
26	2155	48	40	4075	1	32	4	490	1	50	47	0	43	0	49	0	7	15	55	80	4
27	2232	50	25	4123	1	33	8	490	1	50	54	0	44	0	49	0	5	16	57	80	3
28	2308	52	8	4169	1	34	11	4913		50	59	0	45	0	48	0	3	18	58	80	2
29	2383	53	50	4214	1	35	11	491		51	2	0	46	0	48	0	1	19	59	80	1
30	2458	55	32	4257	1	36	11	4916		51	4	0	47	0	47	0	0	10	60	80	0
	North Signe 5. South Signe 11			Signe 4. Signe 10.				Signe 3. Signe 9.				S. 5. S. 11.		S. 4. S. 10.		S. 3. S. 9.		S.5 S.11	S. 4. S. 10.	S.3. S.9.	Argument

Argument of Latitude.

A Table of the Middle Motion of VENUS, for Yeares of the Christian Æra, according to the Julian Account.

Yeares of Christ.	Longitude of ♀ S	D	′	″	Aphelion of ♀. S	D	′	″	Nod. Ascen. ♀. S	D	′	″
001	1	11	07	49	09	09	22	54	1	26	59	16
101	8	00	21	20	09	10	52	55	1	27	59	17
201	2	19	50	51	09	12	22	56	1	28	59	17
301	9	09	12	22	09	13	52	57	1	29	59	18
401	3	28	33	53	09	15	22	58	2	00	59	18
501	10	17	55	24	09	16	52	59	2	01	59	19
601	5	07	16	55	09	18	23	00	2	02	59	19
701	11	26	38	26	09	19	53	01	2	03	59	20
801	6	15	59	57	09	21	23	02	2	04	59	20
901	1	05	21	18	09	22	53	03	2	05	59	21
1001	7	24	42	59	09	24	23	04	2	06	59	21
1101	2	14	04	30	09	26	53	05	2	07	59	22
1201	9	03	26	01	09	28	23	06	2	08	59	22
1301	3	22	47	32	09	29	53	07	2	09	59	23
1401	10	12	09	03	10	01	23	08	2	10	59	23
1501	5	01	30	34	10	02	53	09	2	11	59	24
1601	11	20	52	05	10	04	23	10	2	12	59	24
1701	6	10	13	36	10	05	53	11	2	13	59	25
1801	0	29	35	07	10	07	23	12	2	14	59	25
1901	7	18	56	38	10	08	53	13	2	15	59	26
2001	2	08	18	09	10	10	23	14	2	16	59	26
2101	8	27	39	40	10	11	53	15	2	17	59	27
2201	3	17	01	11	10	13	23	16	2	18	59	27
2301	10	06	22	42	10	14	53	17	2	19	59	28
2401	4	25	44	13	10	16	23	18	2	20	59	28
2501	11	15	05	44	10	17	53	19	2	21	59	29
2601	6	04	27	15	10	19	23	20	2	22	59	29
2701	0	23	48	46	10	20	53	21	2	23	59	30
2801	7	13	10	17	10	22	23	22	2	24	59	30
2901	2	02	31	48	10	23	53	23	2	25	59	31
3001	8	21	53	19	10	25	23	24	2	26	59	31
4001	3	05	28	29	11	10	53	34	3	06	59	36
5001	9	19	03	39	11	25	23	44	3	16	59	41
6001	4	02	38	49	00	10	23	54	3	26	59	46
7001	10	16	33	59	00	25	24	04	4	06	59	51
8001	4	29	49	09	01	10	24	14	4	16	59	56

Months	Com. Year Lon. of ♀ S	D	′	″	Biss. Year Longi. ♀ S	D	′	″	Aph. ♀ ′	″	Nod. asc. ♀ ′	″
Januar.	0	0	0	0	0	0	0	0	0	0	0	0
Febru.	1	19	40	3	1	19	40	3	0	4	0	3
March	3	4	31	42	3	6	7	50	0	9	0	6
Aprill	4	24	11	44	4	25	47	52	0	14	0	9
May	6	12	15	39	6	13	51	47	0	18	0	12
June	8	1	55	42	8	3	31	50	0	22	0	15
July	9	19	57	37	9	21	33	45	0	27	0	18
August	11	9	39	39	11	11	15	47	0	31	0	21
Septemb.	0	29	19	42	1	0	55	50	0	36	0	24
Octob.	2	17	23	37	2	18	59	45	0	41	0	27
Nove.	4	7	3	39	4	8	39	47	0	45	0	30
Decem	5	25	7	34	5	26	43	42	0	50	0	33

A Table of the Annuall Motion of ♀ for supplying of the intermediate Years of the former Table.

	Years included.	Longitude of ♀ S	D	′	″	Aphelion of ♀ S	D	′	″	Node Asc ♀. S	D	′	″
	80	0	15	29	13	0	1	12	01	0	0	48	00
	60	6	11	36	55	0	0	54	01	0	0	36	00
	40	0	07	44	36	0	0	36	06	0	0	24	00
	20	6	03	52	18	0	0	18	00	0	0	12	00
	1	7	14	47	35	0	0	00	54	0	0	0	36
	2	2	29	35	10	0	0	01	48	0	0	01	12
	3	10	14	22	45	0	0	02	42	0	0	01	48
B	4	6	00	46	27	0	0	03	36	0	0	02	24
	5	1	15	34	02	0	0	04	30	0	0	03	00
	6	9	00	21	37	0	0	05	24	0	0	03	36
	7	4	15	09	13	0	0	06	18	0	0	04	12
B	8	0	01	32	55	0	0	07	12	0	0	04	48
	9	7	16	20	30	0	0	08	06	0	0	05	24
	10	3	01	08	05	0	0	09	00	0	0	06	00
	11	10	15	55	40	0	0	09	54	0	0	06	36
B	12	6	02	19	23	0	0	10	48	0	0	07	12
	13	1	17	06	58	0	0	11	42	0	0	07	48
	14	9	01	54	32	0	0	12	36	0	0	08	24
	15	4	16	42	07	0	0	13	30	0	0	09	00
B	16	0	03	05	51	0	0	14	24	0	0	09	36
	17	7	17	53	26	0	0	15	18	0	0	10	12
	18	3	02	41	01	0	0	16	12	0	0	10	48
	19	10	17	28	36	0	0	17	06	0	0	11	24
B	20	6	03	52	18	0	0	18	01	0	0	12	00

Dayes.	Longit. of ♀ S	D	′	″	H ′	Long. ♀ D	′	″	H ′	Longit. of ♀ D	′	″
1	0	1	36	8	1	0	4	0	31	2	4	10
2	0	3	12	16	2	0	8	1	32	2	8	11
3	0	4	48	23	3	0	12	1	33	2	12	11
4	0	6	24	31	4	0	16	1	34	2	16	11
5	0	8	0	39	5	0	20	2	35	2	20	12
6	0	9	36	47	6	0	24	2	36	2	24	12
7	0	11	12	55	7	0	28	2	37	2	28	12
8	0	12	49	3	8	0	32	2	38	2	32	12
9	0	14	25	10	9	0	36	3	39	2	36	13
10	0	16	01	18	10	0	40	3	40	2	40	13
11	0	17	37	26	11	0	44	3	41	2	44	13
12	0	19	13	34	12	0	48	4	42	2	48	14
13	0	20	49	42	13	0	52	4	43	2	52	14
14	0	22	25	50	14	0	56	4	44	2	56	14
15	0	24	01	57	15	1	0	5	45	3	0	15
16	0	25	38	5	16	1	4	5	46	3	4	15
17	0	27	14	13	17	1	8	5	47	3	8	15
18	0	28	50	21	18	1	12	5	48	3	12	16
19	1	0	26	29	19	1	16	6	49	3	16	16
20	1	2	02	37	20	1	20	6	50	3	20	16
21	1	3	38	44	21	1	24	6	51	3	24	17
22	1	5	14	52	22	1	28	7	52	3	28	17
23	1	6	51	0	23	1	32	7	53	3	32	18
24	1	8	27	8	24	1	36	7	54	3	36	18
25	1	10	03	16	25	1	40	8	55	3	40	18
26	1	11	39	23	26	1	44	8	56	3	44	19
27	1	13	15	31	27	1	48	8	57	3	48	19
28	1	14	51	39	28	1	52	9	58	3	52	20
29	1	16	27	47	29	1	56	9	59	3	56	20
30	1	18	03	55	30	2	0	10	60	4	0	20
31	1	19	40	3	″	′	″	‴	″	′	″	‴

A Table of the absolute Æquation of the first inequality of Venus.

Signe 0.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♀ Substract D	′	″	Distan. of ♀ frō ☉
0	0	0	0	0	0	0	0	72807
1	0	0	59	34	0	0	48	72807
2	0	1	59	8	0	1	36	72807
3	0	2	58	43	0	2	24	72806
4	0	3	58	18	0	3	14	72806
5	0	4	57	52	0	4	4	72805
6	0	5	57	27	0	4	55	72804
7	0	6	57	2	0	5	44	72804
8	0	7	56	38	0	6	33	72803
9	0	8	56	13	0	7	22	72802
10	0	9	55	48	0	8	10	72801
11	0	10	55	24	0	8	59	72799
12	0	11	54	59	0	9	48	72797
13	0	12	54	34	0	10	37	72796
14	0	13	54	9	0	11	25	72794
15	0	14	53	44	0	12	14	72792
16	0	15	53	21	0	13	2	72789
17	0	16	52	57	0	13	50	72787
18	0	17	52	33	0	14	36	72784
19	0	18	52	10	0	15	24	72780
20	0	19	51	45	0	16	5	72777
21	0	20	51	21	0	16	55	72774
22	0	21	50	59	0	17	40	72770
23	0	22	50	36	0	18	24	72766
24	0	23	50	14	0	19	10	72763
25	0	24	49	52	0	19	55	72759
26	0	25	49	29	0	20	40	72756
27	0	26	49	7	0	21	24	72752
28	0	27	48	45	0	22	8	72749
29	0	28	48	24	0	22	53	72745
30	0	29	48	2	0	23	37	72740
Anomal.			Adde.					

Signe 11.

Signe 1.

Anomalie co-æquated. S	D	′	″	Æquati. ♀ Substract D	′	″	Distan. of ♀ frō ☉	Degrees
0	29	48	2	0	23	37	72740	30
1	0	47	40	0	24	19	72735	29
1	1	47	19	0	25	1	72731	28
1	2	46	58	0	25	41	72726	27
1	3	46	36	0	26	22	72721	26
1	4	46	15	0	27	2	72717	25
1	5	45	53	0	27	42	72712	24
1	6	45	33	0	28	22	72707	23
1	7	45	12	0	29	0	72701	22
1	8	44	52	0	29	39	72696	21
1	9	44	32	0	30	17	72690	20
1	10	44	13	0	30	57	32684	19
1	11	43	54	0	31	34	72679	18
1	12	43	36	0	32	11	72674	17
1	13	43	17	0	32	46	72668	16
1	14	43	0	0	33	21	72661	15
1	15	42	43	0	33	56	72654	14
1	16	42	26	0	34	30	72648	13
1	17	42	10	0	35	4	72641	12
1	18	41	53	0	35	37	72635	11
1	19	41	37	0	36	10	72628	10
1	20	41	21	0	36	42	72622	9
1	21	41	6	0	37	12	72615	8
1	22	40	51	0	37	42	72610	7
1	23	40	36	0	38	11	72602	6
1	24	40	22	0	38	40	72594	5
1	25	40	7	0	39	8	72586	4
1	26	39	54	0	39	35	72579	3
1	27	39	41	0	40	1	72571	2
1	28	39	28	0	40	28	72565	1
1	29	39	16	0	40	54	72556	0
		Adde.						Anom.

Signe 10.

A Table of the absolute Æquation of the first inequality of Venus.

Signe 2.

Degrees	Anomalie co-æquated. S	D	'	"	Æquati. ♀ Substract. D	'	"	Distanc of ♀ fró ⊙.
0	1	29	39	16	0	40	54	72556
1	2	0	39	4	0	41	18	72550
2	2	1	38	53	0	41	41	52542
3	2	2	38	43	0	42	5	72534
4	2	3	38	31	0	42	28	72527
5	2	4	38	21	0	42	50	72520
6	2	5	38	11	0	43	10	72512
7	2	6	38	2	0	43	29	72503
8	2	7	37	52	0	43	50	72494
9	2	8	37	43	0	44	8	72486
10	2	9	37	34	0	44	27	72477
11	2	10	37	26	0	44	45	72470
12	2	11	37	18	0	44	59	72461
13	2	12	37	11	0	45	16	72452
14	2	13	37	4	0	45	32	72444
15	2	14	36	58	0	45	46	72435
16	2	15	36	51	0	45	59	72427
17	2	16	36	45	0	46	11	72418
18	2	17	36	40	0	46	22	72410
19	2	18	36	35	0	46	33	72401
20	2	19	36	31	0	46	41	72393
21	2	20	36	28	0	46	50	72385
22	2	21	36	25	0	46	58	72376
23	2	22	36	22	0	47	7	72367
24	2	23	36	19	0	47	14	72358
25	2	24	36	17	0	47	20	72350
26	2	25	36	16	0	47	24	72342
27	2	26	36	14	0	47	27	72334
28	2	27	36	14	0	47	30	72326
29	2	28	36	13	0	47	32	72317
30	2	29	36	13	0	47	33	72308
Anomal.	Adde.							

Signe 9.

Signe 3.

Anomalie co-æquated. S	D	'	"	Æquati. ♀ Substract. D	'	"	Distanc of ♀ fró ⊙.	Degrees.
2	29	36	13	0	47	33	72308	30
3	0	36	14	0	47	33	72298	29
3	1	36	15	0	47	33	72290	28
3	2	36	16	0	47	32	72281	27
3	3	36	18	0	47	30	52272	26
3	4	36	21	0	47	26	72263	25
3	5	36	24	0	47	19	72254	24
3	6	36	27	0	47	14	72245	23
3	7	36	30	0	47	8	72237	22
3	8	36	34	0	47	2	72228	21
3	9	36	38	0	46	54	32219	20
3	10	36	42	0	46	45	72211	19
3	11	36	47	0	46	37	72203	18
3	12	36	53	0	46	27	72195	17
3	13	37	0	0	46	16	72187	16
3	14	37	7	0	46	4	72179	15
3	15	37	14	0	45	51	72170	14
3	16	37	21	0	45	38	72161	13
3	17	37	28	0	45	24	72152	12
3	18	37	37	0	45	8	72144	11
3	19	37	46	0	44	52	72136	10
3	20	37	55	0	44	36	72127	9
3	21	38	5	0	44	18	72119	8
3	22	38	15	0	43	55	72110	7
3	23	38	25	0	43	39	72102	6
3	24	38	35	0	43	19	72094	5
3	25	38	46	0	42	57	72086	4
3	26	38	57	0	42	36	72079	3
3	27	39	8	0	42	13	72071	2
3	28	39	20	0	41	50	72064	1
3	29	39	32	0	41	26	72057	0
Adde.								Anomal.

Signe 8.

A Table of the absolute Æquation of the first inequality of Venus.

Signe 4.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ♀ Substract D	′	″	Distan. of ♀ frō ☉
0	3	29	39	32	0	41	26	72057
1	4	0	39	45	0	41	2	72050
2	4	1	39	59	0	40	36	72042
3	4	2	40	13	0	40	9	72034
4	4	3	40	27	0	39	41	72026
5	4	4	40	41	0	39	12	72019
6	4	5	40	56	0	38	42	72011
7	4	6	41	10	0	38	14	72004
8	4	7	41	26	0	37	43	71998
9	4	8	41	41	0	37	13	71991
10	4	9	41	58	0	36	43	71985
11	4	10	42	14	0	36	11	71978
12	4	11	42	30	0	35	37	71972
13	4	12	42	47	0	35	2	71966
14	4	13	43	4	0	34	28	71959
15	4	14	43	21	0	33	54	71953
16	4	15	43	38	0	33	18	71946
17	4	16	43	56	0	32	46	71940
18	4	17	44	14	0	32	5	71934
19	4	18	44	33	0	31	28	71929
20	4	19	44	52	0	30	49	71924
21	4	20	45	11	0	30	10	71918
22	4	21	45	31	0	29	30	71912
23	4	22	45	51	0	28	50	71907
24	4	23	46	11	0	28	10	71902
25	4	24	46	32	0	27	29	71896
26	4	25	46	53	0	26	48	71892
27	4	26	47	14	0	26	7	71887
28	4	27	47	35	0	25	24	71882
29	4	28	47	56	0	24	42	71877
30	4	29	48	17	0	23	59	71873
Anomal.					Adde.			

Signe 7.

Signe 5.

Anomalie co-æquated. S	D	′	″	Æquati. ♀ Substract D	′	″	Distan. of ♀ frō ☉	Degrees
4	29	48	17	0	23	59	71873	30
5	0	48	39	0	23	15	71868	29
5	1	48	59	0	22	31	71864	28
5	2	49	20	0	21	46	71860	27
5	3	49	42	0	21	1	71857	26
5	4	50	5	0	20	16	71853	25
5	5	50	27	0	19	30	71850	24
5	6	50	49	0	18	43	71847	23
5	7	51	11	0	17	58	71844	22
5	8	51	33	0	17	12	71840	21
5	9	51	57	0	16	25	71836	20
5	10	52	21	0	15	37	71833	19
5	11	52	44	0	14	49	71830	18
5	12	53	8	0	14	0	71827	17
5	13	53	32	0	13	12	71824	16
5	14	53	55	0	12	23	71821	15
5	15	54	19	0	11	34	71819	14
5	16	54	43	0	10	46	71818	13
5	17	55	7	0	9	58	71816	12
5	18	55	31	0	9	9	71814	11
5	19	55	55	0	8	20	71813	10
5	20	56	20	0	7	31	71812	9
5	21	56	44	0	6	42	71811	8
5	22	57	8	0	5	52	71810	7
5	23	57	32	0	5	1	71810	6
5	24	57	56	0	4	10	71809	5
5	25	58	21	0	3	20	71808	4
5	26	58	46	0	2	30	71808	3
5	27	59	10	0	1	39	71807	2
5	28	59	35	0	0	49	71807	1
6	0	0	0	0	0	0	71807	0
				Adde.				Anomal.

Signe 6.

A Table of the Inclination, Reduction, and Curtation of VENUS.

Argument of Latitude.

North / South	Signe 0. / Signe 6,				Signe 1. / Signe 7.				Signe 2. / Signe 8.				S. 0. / S. 6.		S. 3. / S. 7.		S. 2. / S. 8.		S0 / S6	S. 1 / S. 7	S. 2 / S. 8	
Degrees	Inclination				Inclination				Inclination				Reduction						Curtation			Degrees
	Parts.	D	′	″	Parts.	D	′	″	Parts.	D	′	″	′	″	′	″	′	″	Pa.	Pa.	Part	
0	0	0	0	0	2132	1	41	22	3693	2	55	38	0	0	2	35	2	35	0	31	95	30
1	75	0	3	32	2196	1	44	26	3729	2	57	23	0	7	2	38	2	3[illegible]	0	33	97	29
2	149	0	7	4	2260	1	47	27	3765	2	59	5	0	13	2	42	2	28	0	35	99	28
3	223	0	10	36	2322	1	50	25	3799	3	0	43	0	19	2	45	2	25	1	37	101	27
4	297	0	14	9	2384	1	53	22	3832	3	2	17	0	26	2	47	2	21	1	3[illegible]	103	26
5	372	0	17	40	2446	1	56	18	3864	3	3	48	0	32	2	50	2	16	2	41	105	25
6	446	0	21	11	2506	1	59	13	3895	3	5	15	0	38	2	52	2	12	2	43	107	24
7	520	0	24	41	2566	2	2	3	3925	3	6	38	0	45	2	54	2	8	3	45	108	23
8	593	0	28	11	2625	2	4	52	3954	3	8	1	0	51	2	55	2	3	4	48	109	22
9	698	0	31	41	2683	2	7	37	3981	3	9	19	0	57	2	56	1	59	4	50	111	21
10	740	0	35	11	2741	2	10	21	4007	3	10	34	1	2	2	56	1	24	5	52	112	20
11	814	0	38	40	2797	2	13	2	4032	3	11	44	1	8	2	57	1	50	6	54	113	19
12	886	0	42	9	2853	2	15	42	4055	3	12	52	1	13	2	58	1	45	6	56	114	18
13	959	0	45	37	2908	2	18	18	4078	3	13	56	1	18	2	59	1	40	7	58	115	17
14	1032	0	49	4	2962	2	20	52	4099	3	14	57	1	24	2	59	1	34	8	60	116	16
15	1104	0	52	28	3015	2	23	23	4019	3	15	54	1	29	3	0	1	29	9	63	117	15
16	1176	0	55	52	3067	2	25	51	4137	3	16	47	1	34	2	59	1	24	10	66	118	14
17	1247	0	59	15	3118	2	28	18	4155	3	17	37	1	40	2	59	1	18	11	68	119	13
18	1318	1	2	37	3169	2	30	41	4171	3	18	24	1	45	2	58	1	13	12	70	120	12
19	1388	1	5	59	3218	2	33	2	4186	3	19	6	1	50	2	57	1	8	13	72	121	11
20	1458	1	9	20	3266	2	35	20	4199	3	19	45	1	54	2	56	1	2	14	74	122	10
21	1528	1	12	40	3314	2	37	36	4212	3	20	20	1	59	2	56	0	57	16	76	123	9
22	1597	1	15	59	3360	2	39	49	4223	3	20	52	2	3	2	55	0	51	17	78	124	8
23	1666	1	19	14	3405	2	41	58	4232	3	21	20	2	8	2	54	0	45	18	81	124	7
24	1734	1	22	28	3450	2	44	3	4241	3	21	44	2	12	2	52	0	38	20	83	125	6
25	1802	1	25	41	3493	2	46	7	4248	3	22	4	2	16	2	50	0	32	21	85	125	5
26	1869	1	28	51	3535	2	48	7	4254	3	22	21	2	21	2	47	0	26	23	87	125	4
27	1936	1	32	0	3576	2	50	4	4258	3	22	33	2	25	2	45	0	19	25	89	126	3
28	2002	1	35	9	3616	2	51	59	4261	3	22	42	2	28	2	42	0	13	27	91	126	2
29	2067	1	38	17	3655	2	53	49	4263	3	22	48	2	32	2	38	0	7	29	93	126	1
30	2132	1	41	22	3693	2	55	38	4264	3	22	50	2	35	2	35	0	0	31	95	126	0
North / South	Signe 5. / Signe 11.				Signe 4. / Signe 10.				Signe 3. / Signe 9.				S. 5. / S. 11.		S. 4. / S. 10.		S. 3. / S. 9.		S 5 / S 11	S 4 / S 10	S 3 / S 9	Argu.

Argument of Latitude.

A Table of the Middle Motion of MERCURY, for Yeares of the Christian Æra, according to the Julian Account.

Yeares of Christ.	Longitude of ☿ S D ′ ″	Aphelion of ☿ S D ′ ″	Nod. Ascen. ☿ S D ′ ″
001	10 12 09 43	6 26 23 41	0 02 29 57
101	0 26 34 43	6 29 17 43	0 04 59 57
201	3 10 59 43	7 02 11 45	0 07 29 58
301	5 25 24 44	7 05 05 47	0 09 59 58
401	8 09 49 44	7 07 59 49	0 12 29 58
501	10 24 14 44	7 10 53 51	0 14 59 58
601	1 08 39 45	7 13 47 53	0 17 29 58
701	3 23 04 45	7 16 41 56	0 19 59 58
801	6 07 29 45	7 19 35 58	0 22 29 59
901	8 21 54 46	7 22 30 00	0 24 59 59
1001	11 06 19 46	7 25 24 02	0 27 29 59
1101	1 20 44 46	7 28 18 04	0 29 59 59
1201	4 05 09 47	8 01 12 06	1 02 29 59
1301	6 19 34 47	8 04 06 08	1 04 59 59
1401	9 03 59 47	8 07 00 11	1 07 30 00
1501	11 18 24 48	8 09 54 13	1 10 00 00
1601	2 02 49 48	8 12 48 15	1 12 30 00
1701	4 17 14 48	8 15 42 17	1 15 00 00
1801	7 01 39 49	8 18 36 19	1 17 30 00
1901	9 16 04 49	8 21 30 21	1 20 00 00
2001	0 00 29 49	8 24 24 23	1 22 30 01
2101	2 14 54 50	8 27 18 25	1 25 00 01
2201	4 29 19 50	9 00 12 28	1 27 30 01
2301	7 13 44 50	9 03 06 30	2 00 00 01
2401	9 28 09 51	9 06 00 32	2 02 30 01
2501	0 12 34 51	9 08 54 34	2 05 00 01
2601	2 26 59 51	9 11 48 36	2 07 30 02
2701	5 11 24 52	9 14 42 38	2 10 00 0[illegible]
2801	7 25 49 52	9 17 36 40	2 12 30 02
2901	10 10 14 52	9 20 30 42	2 15 00 02
3001	0 24 39 53	9 23 24 45	2 17 30 02
4001	1 18 49 57	10 22 25 06	3 12 30 04
5001	2 13 00 01	11 21 25 28	4 07 30 06
6001	3 07 10 05	0 20 25 30	5 2 30 08
7001	4 01 20 08	1 19 26 12	5 27 30 10
8001	4 25 30 12	2 18 26 34	6 22 30 12

Months	Com. Year Lon. of ☿ S D ′ ″	Biss. Year Longi. ☿ S D ′ ″	Aph. ☿ ′ ″	Nod as. ☿ ′ ″
Januar.	0 0 0 0	0 00 00 00	0 0	0 0
Febru.	4 6 51 50	4 06 51 50	0 9	0 8
March	8 1 27 3	8 05 32 35	0 17	0 15
Aprill	0 8 18 53	0 12 24 25	0 26	0 23
May	4 11 5 11	4 15 10 43	0 35	0 29
June	8 17 57 1	8 22 02 33	0 44	0 37
July	0 20 43 19	0 24 48 51	0 52	0 44
August	4 27 35 9	5 01 40 41	1 1	0 52
Septēb	9 4 26 59	9 08 32 31	1 9	1 0
Octob.	1 7 13 17	1 11 18 49	1 18	1 8
Nove.	5 14 5 8	5 18 10 40	1 27	1 15
Decem	9 16 51 26	9 20 56 58	1 35	1 22

A Table of the Annuall Motion of ☿ for supplying of the intermediate Years of the former Table.

	Years included.	Longitude of ☿ S D ′ ″	Aphelion of ☿ S D ′ ″	Node Asc ☿. S D ′ ″
	80	1 29 32 00	0 2 19 14	0 2 00 00
	60	1 14 39 00	0 1 44 25	0 1 30 00
	40	0 29 46 00	0 1 09 37	0 1 00 00
	20	0 14 53 00	0 0 34 48	0 0 30 00
	1	1 23 43 16	0 0 01 44	0 0 01 30
	2	3 17 26 32	0 0 03 28	0 0 03 00
	3	5 11 09 48	0 0 05 13	0 0 04 30
B	4	7 08 58 36	0 0 06 57	0 0 06 0
	5	9 02 41 52	0 0 08 41	0 0 07 30
	6	10 26 25 08	0 0 10 26	0 0 09 0
	7	0 20 08 24	0 0 12 10	0 0 10 30
B	8	2 17 57 13	0 0 13 59	0 0 12 0
	9	4 11 40 28	0 0 15 39	0 0 13 30
	10	6 05 23 44	0 0 17 24	0 0 15 0
	11	7 29 07 00	0 0 19 08	0 0 16 30
B	12	9 26 55 49	0 0 20 53	0 0 18 0
	13	11 20 39 05	0 0 22 37	0 0 19 30
	14	1 14 22 21	0 0 34 22	0 0 21 0
	15	3 08 05 37	0 0 26 06	0 0 22 30
B	16	5 05 54 25	0 0 27 51	0 0 24 0
	17	6 29 37 41	0 0 29 35	0 0 25 30
	18	8 23 20 57	0 0 31 19	0 0 27 0
	19	10 17 4 13	0 0 35 [illegible]	0 0 28 30
B	20	0 14 53 00	0 0 34 [illegible]	0 0 30 0

Days.	Longt. of ☿ S D ′ ″	H ′	Long. ☿ D ′ ″	H ′	Longit. of ☿ D ′ ″
1	0 4 5 32	1	0 10 14	31	5 17 9
2	0 8 11 5	2	0 20 28	32	5 27 22
3	0 12 16 38	3	0 30 42	33	5 37 36
4	0 16 22 10	4	0 40 56	34	5 47 50
5	0 20 27 43	5	0 51 9	35	5 58 4
6	0 24 33 16	6	1 1 23	36	6 8 18
7	0 28 38 48	7	1 11 37	37	6 18 32
8	1 2 44 21	8	1 21 51	38	6 28 46
9	1 6 49 53	9	1 31 5	39	6 39 0
10	1 10 55 26	10	1 42 19	40	6 49 14
11	1 15 0 58	11	1 52 32	41	6 59 28
12	1 19 6 31	12	2 2 46	42	7 9 42
13	1 23 12 4	13	2 13 0	43	7 19 56
14	1 27 17 36	14	2 23 14	44	7 3[illegible] [illegible]
15	2 1 23 9	15	2 33 28	45	7 40 22
16	2 5 28 41	16	2 43 41	46	7 50 36
17	2 9 34 14	17	2 53 55	47	8 0 50
18	2 13 39 47	18	3 4 9	48	8 11 4
19	2 17 45 19	19	3 14 23	49	8 21 18
20	2 21 50 52	20	3 24 37	50	8 31 32
21	2 25 56 24	21	3 34 51	51	8 41 46
22	3 0 1 57	22	3 45 4	52	8 52 0
23	3 4 7 30	23	3 55 18	53	9 2 14
24	3 8 13 2	24	4 5 32	54	9 12 28
25	3 12 18 35	25	4 15 46	55	9 22 42
26	3 16 24 7	26	4 26 0	56	9 32 56
27	3 20 29 40	27	4 36 14	57	9 43 10
28	3 24 35 13	28	4 46 28	58	9 53 24
29	3 28 40 45	29	4 56 42	59	10 3 38
30	4 2 46 18	30	5 6 56	60	11 13 52
31	4 6 51 50	″	′ ″ ‴	″	″′ ‴

A Table of the absolute Æquation of the first inequality of Mercury.

	Signe 0.								Signe 1.								
Degrees	Anomalie co-æquated.				Æquati. ☿ Substract.			Distan. of ☿ fró ☉.	Anomalie co-æquated.				Æquati. ☿ Substract.			Distan. of ☿ fró ☉.	Degrees.
	S	D	′	″	D	′	″		S	D	′	″	D	′	″		
0	0	0	0	0	0	0	0	46770	0	23	27	24	9	42	45	46081	30
1	0	0	46	17	0	20	22	46769	0	24	15	39	10	0	57	46035	29
2	0	1	32	35	0	40	42	46766	0	25	4	3	10	19	1	45987	28
3	0	2	18	56	1	0	59	46763	0	25	52	36	10	36	57	45935	27
4	0	3	5	7	1	21	9	46758	0	26	41	17	10	54	48	45882	26
5	0	3	51	25	1	41	18	46751	0	27	30	7	11	12	36	45829	25
6	0	4	37	45	2	1	22	46742	0	28	19	4	11	30	18	45775	24
7	0	5	24	7	2	21	23	46732	0	29	8	11	11	47	53	45717	23
8	0	6	10	31	2	41	24	46722	0	29	57	28	12	5	22	45669	22
9	0	6	56	58	3	1	20	46707	1	0	46	55	12	22	42	45601	21
10	0	7	44	27	3	21	15	46691	1	1	36	31	12	39	58	45539	20
11	0	8	29	59	3	41	7	46674	1	2	26	14	12	56	7	45477	19
12	0	9	16	34	4	0	49	46656	1	3	16	8	13	14	9	45411	18
13	0	10	3	10	4	20	27	46637	1	4	6	14	13	31	3	45343	17
14	0	10	49	49	4	40	1	46617	1	4	56	31	13	47	52	45275	16
15	0	11	36	32	4	59	30	46596	1	5	46	58	14	4	32	45205	15
16	0	12	23	7	5	18	55	46574	1	6	37	36	14	21	4	45133	14
17	0	13	10	4	5	38	16	46549	1	7	28	26	14	37	29	45059	13
18	0	13	57	0	5	57	37	46523	1	8	19	28	14	53	48	44987	12
19	0	14	43	59	6	16	50	46494	1	9	10	42	15	9	59	44913	11
20	0	15	31	3	6	35	59	46465	1	10	2	7	15	26	1	44833	10
21	0	16	8	14	6	55	3	46432	1	10	53	43	15	41	56	44752	9
22	0	17	5	30	7	14	0	46400	1	11	45	31	15	57	41	44673	8
23	0	17	52	52	7	32	52	46366	1	12	37	32	16	13	16	44552	7
24	0	18	40	20	7	51	42	46331	1	13	29	48	16	28	49	44506	6
25	0	19	27	57	8	10	26	46293	1	14	22	17	16	44	11	44420	5
26	0	20	15	38	8	29	6	46253	1	15	14	58	16	59	23	44333	4
27	0	21	3	24	8	47	39	46214	1	16	7	50	17	14	24	44243	3
28	0	21	51	16	9	6	6	46170	1	16	0	59	17	29	13	44152	2
29	0	22	39	16	9	24	27	46126	1	17	54	18	17	43	54	44059	1
30	0	23	27	24	9	42	45	46081	1	18	47	47	17	58	24	43964	0
Anomal.	Adde.								Adde.								Anomal.
	Signe 11.								Signe 10.								

A Table of the absolute Æquation of the first inequality of Mercury.

Signe 2.

Degrees.	Anomalie co-æquated. S	D	′	″	Æquati. ☿ Substract D	′	″	Distan. of ☿ fró ☉	
0	1	18	47	47	17	58	24	43964	
1	1	19	41	34	18	12	43	43867	
2	1	20	35	35	18	26	53	43769	
3	1	21	29	52	18	40	56	43670	
4	1	22	24	20	18	54	44	43568	
5	1	23	19	4	19	8	18	43466	
6	1	24	14	2	19	21	42	43364	
7	1	25	9	15	19	34	54	43258	
8	1	26	4	43	19	47	55	43150	
9	1	27	0	26	20	0	42	43043	
10	1	27	56	23	20	13	17	42933	
11	1	28	52	33	20	25	47	42822	
12	1	29	48	58	20	37	44	42707	
13	2	0	45	38	20	49	34	42592	
14	2	1	42	34	21	1	12	42474	
15	2	2	39	45	21	12	37	42356	
16	2	3	37	14	21	23	44	42236	
17	2	4	34	56	21	34	32	42118	
18	2	5	32	56	21	45	6	41993	
19	2	6	31	4	21	55	23	41870	
20	2	7	29	33	22	5	22	41746	
21	2	8	28	19	22	15	4	41620	
22	2	9	27	21	22	24	28	41493	
23	2	10	26	35	22	33	31	41364	364
24	2	11	26	4	22	42	18	41234	
25	2	12	25	49	22	50	44	41103	
26	2	13	25	49	22	58	39	40971	
27	2	14	26	4	23	6	28	40838	
28	2	15	26	34	23	13	53	40701	
29	2	16	27	21	23	20	54	40563	
30	2	17	28	24	23	27	36	40426	
Anomal.			Adde.						

Signe 9.

Signe 3.

Anomalie co-æquated. S	D	′	″	Æquati. ☿ Substract D	′	″	Distan of ☿ fró ☉.	Degrees	
2	17	28	24	23	27	36	40426	30	
2	18	29	41	23	33	52	40288	29	
2	19	31	14	23	39	46	40147	28	
2	20	33	1	23	45	14	39906	27	905
2	21	35	2	23	50	21	39865	26	
2	22	37	17	23	55	1	39722	25	
2	23	39	47	23	59	8	39580	24	
2	24	42	33	24	2	41	39436	23	
2	25	45	31	24	6	7	39290	22	
2	26	48	46	24	9	6	39140	21	
2	27	52	13	24	11	34	38998	20	
2	28	55	54	24	13	33	38851	19	
2	29	59	50	24	15	6	38701	18	
3	1	4	21	24	16	8	38553	17	
3	2	8	23	24	16	40	38409	16	
3	3	12	57	24	16	42	38259	15	
3	4	17	46	24	16	15	38106	14	
3	5	22	48	24	15	18	37953	13	
3	6	28	3	24	13	48	37807	12	
3	7	34	24	24	11	45	37657	11	
3	8	40	4	24	9	5	37507	10	
3	9	45	56	24	6	2	37357	9	
3	10	51	31	24	2	23	37206	8	
3	11	57	17	23	58	13	37054	7	
3	13	3	45	23	53	33	36902	6	
3	14	10	23	23	48	25	36753	5	
3	15	17	11	23	42	27	36604	4	
3	16	24	9	23	35	58	36455	3	
3	17	31	17	23	28	59	36303	2	
3	18	38	37	23	21	15	36153	1	
3	19	46	8	23	13	8	36002	0	
		Adde.						Anomal.	

Signe 8.

A Table of the absolute Æquation of the first inequality of Mercury.

Signe 4.

Degrees	Anomalie co-æquated. S	D	′	″	Æquati. ☿ Substract. D	′	″	Distan. of ☿ frō ☉.
0	3	19	46	8	23	13	8	36002
1	3	20	53	48	23	4	26	35855
2	3	22	1	37	22	55	20	35708
3	3	23	9	36	22	45	26	35555
4	3	24	17	43	22	34	47	35405
5	3	25	25	59	22	23	39	35256
6	3	26	34	21	22	11	57	35120
7	3	27	42	50	21	59	45	34975
8	3	28	51	29	21	46	56	34833
9	4	0	0	18	21	33	36	34691
10	4	1	9	17	21	19	26	34550
11	4	2	18	22	21	4	40	34413
12	4	3	27	33	20	49	28	34274
13	4	4	36	49	20	33	39	34138
14	4	5	46	10	20	17	23	33999
15	4	6	55	38	20	0	28	33869
16	4	8	5	14	19	43	2	33739
17	4	9	14	56	19	24	56	33610
18	4	10	24	43	19	6	12	33477
19	4	11	34	33	18	47	2	33353
20	4	12	44	30	18	27	18	33226
21	4	13	54	32	18	7	5	33107
22	4	15	4	40	17	46	15	32985
23	4	16	14	53	17	24	56	32865
24	4	17	25	10	17	3	8	32746
25	4	18	35	26	16	40	45	32636
26	4	19	45	44	16	17	54	32524
27	4	20	56	9	15	54	40	32412
28	4	22	6	40	15	30	45	32306
29	4	23	17	16	15	6	29	32200
30	4	24	28	00	14	41	54	32097
Anomal.	Adde.							

Signe 7.

Signe 5.

Anomalie co-æquated. S	D	′	″	Æquati. ☿ Substract. D	′	″	Distan. of ☿ frō ☉.	Degrees
4	24	28	0	14	41	54	32097	30
4	25	38	38	14	17	20	31997	29
4	26	49	19	13	51	8	31903	28
4	28	0	8	13	25	7	31811	27
4	29	10	56	12	58	32	31718	26
5	0	21	47	12	31	40	31628	25
5	1	32	40	12	4	42	31545	24
5	2	43	36	11	37	5	31453	23
5	3	54	33	11	9	10	31382	22
5	5	5	32	10	40	58	31305	21
5	6	16	31	10	12	27	31235	20
5	7	27	32	9	43	36	31166	19
5	8	38	34	9	14	27	31100	18
5	9	49	37	8	44	58	31038	17
5	11	0	41	8	15	23	30978	16
5	12	11	48	7	45	30	30921	15
5	13	22	57	7	15	34	30896	14
5	14	34	7	6	45	3	30818	13
5	15	45	17	6	14	26	30776	12
5	16	56	28	5	43	46	30731	11
5	18	7	39	5	13	1	30693	10
5	19	18	51	4	42	1	30659	9
5	20	30	4	4	10	54	30629	8
5	21	41	18	3	39	36	30601	7
5	22	52	33	3	8	20	30578	6
5	24	3	49	2	37	5	30557	5
5	25	15	4	2	5	46	30539	4
5	26	26	19	1	34	22	30527	3
5	27	37	33	1	2	55	30519	2
5	28	48	47	0	31	29	30514	1
6	00	00	00	0	00	00	30510	0
Adde.								Anomal.

Signe 6.

A Table of the Inclination, Reduction, and Curtation of MERCURY.

Argument of Latitude.

Degrees	North Signe 0. South Signe 6. Inclination. Parts	D	′	″	Signe 1. Signe 7. Inclination. Parts	D	′	″	Signe 2. Signe 8. Inclination. Parts	D	′	″	Reduction. S. 0. S. 6. ′	″	S. 1. S. 7. ′	″	S. 2. S. 8. ′	″	Curtation. S.0 S.6 Pa	S. 1. S. 7. Part	S. 2. S8. Part	Degrees
0	0	0	0	0	2297	3	27	0	3979	5	58	32	0	00	10	49	10	49	0	69	207	30
1	80	0	7	13	2366	3	33	13	4018	6	2	6	0	20	11	2	10	36	0	73	211	29
2	160	0	14	27	2434	3	39	22	4056	6	5	33	0	52	11	14	10	22	0	77	215	28
3	240	0	21	40	2502	3	45	28	4093	6	8	53	1	18	11	25	10	7	1	82	219	27
4	320	0	28	53	2569	3	51	3	4129	6	12	6	1	44	11	35	9	51	1	86	223	26
5	400	0	36	5	2635	3	57	28	4163	6	15	13	2	10	11	44	9	34	2	91	227	25
6	480	0	43	16	2700	4	3	21	4197	6	18	13	2	35	11	53	9	17	3	96	230	24
7	560	0	50	26	2765	4	9	9	4229	6	21	6	3	1	10	1	8	59	4	101	234	23
8	639	0	57	36	2828	4	14	53	4260	6	23	51	3	26	12	8	8	41	5	106	237	22
9	719	1	4	45	2891	4	20	32	4289	6	26	29	3	51	12	14	8	22	7	110	240	21
10	799	1	11	53	2953	4	26	6	4317	6	29	0	4	16	12	19	8	2	8	115	243	20
11	877	1	18	59	3014	4	31	35	4344	6	31	24	4	40	12	23	7	42	10	119	247	19
12	955	1	26	4	3074	4	37	0	4369	6	33	42	5	4	12	26	7	21	12	124	250	18
13	1033	1	33	7	3133	4	42	20	4393	6	35	53	5	28	12	28	6	59	14	128	253	17
14	1111	1	40	8	3191	4	47	35	4416	6	37	57	5	51	12	29	6	37	16	133	256	16
15	1189	1	47	8	3249	4	52	45	4437	6	39	53	6	14	12	30	6	14	18	138	258	15
16	1264	1	54	6	3305	4	57	49	4457	6	41	42	6	37	12	29	5	51	21	143	260	14
17	1342	2	1	2	3360	5	2	48	4476	6	43	23	6	59	12	28	5	28	23	148	262	13
18	1420	2	7	56	3414	5	7	4	4494	6	44	57	7	21	12	26	5	4	26	152	264	12
19	1498	2	14	47	3467	5	12	28	4510	6	46	24	7	42	12	23	4	40	29	157	266	11
20	1571	2	21	35	3519	5	17	5	4524	6	47	43	8	2	12	19	4	16	32	161	268	10
21	1646	2	28	21	3570	5	21	44	4537	6	48	54	8	22	12	14	3	51	36	166	269	9
22	1721	2	35	5	3620	5	26	13	4549	6	49	58	8	41	12	8	3	26	39	171	271	8
23	1795	2	41	46	3669	5	30	37	4560	6	50	55	8	59	12	1	3	1	43	175	272	7
24	1869	2	48	22	3717	5	34	55	4569	6	51	44	9	17	11	53	2	35	46	180	273	6
25	1942	2	54	58	3763	5	39	7	4576	6	52	25	9	34	11	44	2	10	50	185	274	5
26	2014	3	1	29	3809	5	43	13	4583	6	52	59	9	51	11	35	1	44	53	189	275	4
27	2086	3	7	57	3853	5	47	13	4588	6	53	26	10	7	11	25	1	18	57	194	276	3
28	2157	3	14	22	3896	5	51	36	4591	6	53	45	10	22	11	14	0	52	61	199	277	2
29	2227	3	20	43	3938	5	54	52	4593	6	53	56	10	36	11	2	0	20	65	203	277	1
30	2297	3	27	0	3979	5	58	32	4594	6	54	0	10	49	10	49	0	00	69	207	277	0
Argu.	North Signe 5. South Signe 11				Signe 4. Signe 10.				Signe 3. Signe 9.				S. 5. S. 11.		S. 4. S. 10.		S. 3. S. 9.		S.5 S.11	S.4. S.10.	S.3. S.9.	

Argument of Latitude.

A Table of Declinations.

North Latitude.

	0		1		2		3		4		5	
	D	′	D	′	D	′	D	′	D	′	D	′
♋	23	31	24	31	25	31	26	31	27	31	28	31
1	23	31	24	31	25	31	26	31	27	31	28	31
2	23	31	24	31	25	31	26	31	27	31	28	31
3	23	30	24	30	25	30	26	30	27	30	28	30
4	23	28	24	29	25	28	26	28	27	28	28	28
5	23	26	24	26	25	26	26	26	27	25	28	25
6	23	23	24	23	25	23	26	23	27	22	28	22
7	23	20	24	20	25	20	26	20	27	19	28	19
8	23	17	24	17	25	17	26	16	27	16	28	16
9	23	13	24	13	25	13	26	13	27	12	28	12
10	23	09	24	09	25	09	26	09	27	08	28	08
11	23	04	24	04	25	04	26	04	27	03	28	03
12	22	59	23	59	24	59	25	59	26	58	27	58
13	22	53	23	53	24	53	25	53	26	52	27	52
14	22	47	23	47	24	46	25	46	26	46	27	45
15	22	41	23	41	24	40	25	40	26	40	27	39
16	22	34	23	34	24	33	25	33	26	33	27	32
17	22	27	23	27	24	26	25	26	26	25	27	25
18	22	19	23	19	24	18	25	18	26	17	27	16
19	22	10	23	10	24	09	25	09	26	08	27	07
20	22	02	23	02	24	01	25	00	25	59	26	58
21	21	53	22	53	23	52	24	51	25	50	26	49
22	21	43	22	43	23	42	24	41	25	40	26	39
23	21	33	22	33	23	32	24	31	25	30	26	29
24	21	23	22	22	23	21	24	20	25	19	26	18
25	21	13	22	11	23	10	24	09	25	08	26	07
26	21	01	22	00	22	59	23	58	24	57	25	56
27	20	50	21	48	22	47	23	46	24	45	25	44
28	20	38	21	36	22	35	23	34	24	33	25	32
29	20	26	21	23	22	22	23	21	24	20	25	19
30	20	13	21	12	22	10	23	09	24	07	25	06

♌	20	13	21	12	22	10	23	09	24	07	25	06
1	20	00	20	59	21	57	22	55	23	54	24	53
2	19	47	20	45	21	44	22	42	23	40	24	39
3	19	33	20	31	21	30	22	28	23	26	24	25
4	19	19	20	17	21	16	22	14	23	12	24	11
5	19	05	20	03	21	02	22	00	22	58	23	56
6	18	50	19	49	20	47	21	45	22	43	23	41
7	18	35	19	34	20	32	21	29	22	27	23	25
8	18	20	19	18	20	16	21	13	22	11	23	09
9	18	04	19	02	20	00	20	57	21	55	22	53
10	17	48	18	46	19	44	20	41	21	39	22	37
11	17	32	18	29	19	27	20	25	21	22	22	20
12	17	15	18	12	19	10	20	08	21	05	22	03
13	16	58	17	55	18	53	19	51	20	48	21	46
14	16	41	17	38	18	36	19	33	20	30	21	28
15	16	24	17	21	18	18	19	15	20	12	21	10
16	16	06	17	03	18	00	18	57	19	54	20	52
17	15	48	16	45	17	42	18	39	19	36	20	33
18	15	29	16	26	17	23	18	20	19	17	20	14
19	15	11	16	08	17	04	18	01	18	58	19	55
20	14	52	15	49	16	45	17	42	18	39	19	36
21	14	33	15	30	16	26	17	23	18	20	19	17
22	14	14	15	11	16	07	17	04	18	00	18	57
23	13	54	14	51	15	47	16	44	17	40	18	37
24	13	34	14	31	15	27	16	24	17	20	18	17
25	13	14	14	11	15	07	16	04	17	00	17	57
26	12	54	13	51	14	47	15	43	16	38	17	36
27	12	33	13	30	14	26	15	22	16	19	17	15
28	12	13	13	09	14	05	15	01	15	57	16	54
29	11	52	12	48	13	44	14	40	15	36	16	33
30	11	31	12	27	13	23	14	19	15	15	16	11

South Latitude.

0		1		2		3		4		5		
D	′	D	′	D	′	D	′	D	′	D	′	
23	31	22	31	21	31	20	31	19	31	18	31	30
23	31	22	31	21	31	20	31	19	31	18	31	29
23	31	22	31	21	31	20	31	19	31	18	31	28
23	30	22	30	21	30	20	30	19	30	18	30	27
23	28	22	28	21	28	20	28	19	28	18	28	26
23	26	22	26	21	26	20	26	19	26	18	26	25
23	23	22	23	21	23	20	23	19	23	18	23	24
23	20	22	20	21	20	20	20	19	20	18	20	23
23	17	22	17	21	17	20	17	19	17	18	17	22
23	13	22	13	21	13	20	13	19	13	18	13	21
23	09	22	09	21	09	20	09	19	09	18	09	20
23	04	22	04	21	04	20	04	19	05	18	05	19
22	59	21	59	20	59	19	59	19	00	18	00	18
22	53	21	53	20	53	19	53	18	54	17	54	17
22	47	21	47	20	47	19	47	18	48	17	48	16
22	41	21	41	20	41	19	41	18	42	17	42	15
22	34	21	35	20	35	19	35	18	36	17	36	14
22	27	21	28	20	28	19	28	18	29	17	29	13
22	19	21	20	20	20	19	21	18	21	17	22	12
22	10	21	11	20	11	19	12	18	13	17	13	11
22	02	21	03	20	04	19	04	18	05	17	05	10
21	53	20	54	19	55	18	56	17	56	16	56	9
21	43	20	44	19	45	18	46	17	47	16	46	8
21	33	20	34	19	35	18	36	17	37	16	37	7
21	23	20	24	19	25	18	26	17	27	16	28	6
21	12	20	14	19	15	18	16	17	17	16	18	5
21	01	20	02	19	03	18	04	17	05	16	07	4
20	50	19	51	18	52	17	53	16	54	15	56	3
20	38	19	39	18	40	17	41	16	42	15	44	2
20	26	19	27	18	28	17	29	16	30	15	32	1
20	13	19	14	18	15	17	17	16	18	15	19	♊

20	13	19	14	18	16	17	17	16	18	15	20	30
20	00	19	01	18	03	17	04	16	05	15	07	29
19	47	18	48	17	50	16	51	15	52	14	54	28
19	33	18	35	17	36	16	38	15	39	14	41	27
19	19	18	21	17	22	16	24	15	26	14	27	26
19	05	18	07	17	08	16	10	15	12	14	13	25
18	50	17	52	16	54	15	56	14	58	13	59	24
18	35	17	37	16	39	15	41	14	43	13	44	23
18	[illegible]	17	22	16	24	15	26	14	28	13	29	22
18	04	17	06	16	08	15	10	14	12	13	14	21
17	48	16	50	15	52	14	54	13	56	12	58	20
17	32	16	34	15	36	14	38	13	40	12	42	19
17	15	16	17	15	20	14	22	13	24	12	26	18
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16	41	15	43	14	46	13	48	12	51	11	53	16
16	24	15	26	14	28	13	31	12	34	11	36	15
16	06	15	08	14	11	13	14	12	17	11	19	14
15	48	14	50	13	53	12	56	11	59	11	01	13
15	29	14	32	13	35	12	38	11	41	10	43	12
15	11	14	14	13	17	22	20	11	23	10	25	11
14	52	13	55	12	58	12	01	11	04	10	07	10
14	33	13	36	12	39	11	42	10	45	09	48	9
14	13	13	17	12	20	11	23	10	26	9	29	8
13	54	12	58	12	01	11	04	10	07	09	16	7
13	34	12	38	11	41	10	44	09	48	08	51	6
13	14	12	18	11	21	10	24	09	28	08	31	5
12	54	11	57	11	01	10	04	09	03	8	11	4
12	33	11	36	10	50	09	44	08	47	07	50	3
12	13	11	16	10	29	09	24	08	27	07	31	2
11	52	10	56	10	00	09	04	08	07	07	11	1
11	31	10	35	09	39	08	43	07	46	6	50	♉

A Table of Declinations.

North Latitude.

	0	1	2	3	4	5
	D ′	D ′	D ′	D ′	D ′	D ′
♍	11 31	12 27	13 23	14 19	15 15	16 11
1	11 09	12 05	13 02	13 57	14 53	15 49
2	10 48	11 45	12 41	13 36	14 32	15 28
3	10 26	11 23	12 19	13 14	14 10	15 06
4	10 05	11 01	11 57	12 52	13 48	14 44
5	9 43	10 39	11 35	12 30	13 26	14 22
6	9 21	10 17	11 13	12 08	13 04	14 00
7	8 58	9 55	10 51	11 46	12 42	13 37
8	8 36	9 32	10 28	11 23	12 19	13 14
9	8 13	9 05	10 09	11 01	11 56	12 51
10	7 51	8 46	9 42	10 38	11 33	12 28
11	7 28	8 23	9 18	10 14	11 09	12 05
12	7 05	8 00	8 56	9 51	10 46	11 42
13	6 42	7 37	8 32	9 28	10 23	11 19
14	6 19	7 14	8 09	9 05	10 00	10 56
15	5 56	6 52	7 47	8 42	9 37	10 33
16	5 33	6 29	7 24	8 19	9 14	10 10
17	5 00	6 05	7 00	7 55	8 50	9 46
18	4 46	5 42	6 36	7 32	8 27	9 22
19	4 22	5 18	6 12	7 08	8 03	8 58
20	3 58	4 54	5 48	6 44	7 39	8 34
21	3 35	4 30	5 25	6 20	7 15	8 10
22	3 11	4 07	5 02	5 57	7 02	7 47
23	2 47	3 43	4 38	5 33	6 28	7 23
24	2 24	3 19	4 14	5 09	6 04	6 59
25	2 00	2 55	3 50	4 45	5 50	6 35
26	1 36	2 31	3 26	4 21	5 16	6 11
27	1 12	2 07	3 02	3 57	4 52	5 47
28	0 48	1 43	2 38	3 33	4 28	5 23
29	0 24	1 19	2 14	3 09	4 04	4 59
30	0 00	0 55	1 50	2 45	3 40	4 35

	0	1	2	3	4	5
♎	0 00	0 55	1 50	2 45	3 40	4 35
1	0 24	0 31	1 27	2 21	3 16	4 11
2	0 48	0 07	1 03	1 57	2 52	3 47
3	1 12	0 17	0 39	1 34	2 29	3 24
4	1 36	0 41	0 15	1 10	2 05	3 00
5	2 00	1 05	0 09	0 46	1 41	2 36
6	2 24	1 29	0 34	0 22	1 17	2 02
7	2 47	1 52	0 57	0 02	0 53	1 48
8	3 11	2 16	1 21	0 26	0 29	1 25
9	3 35	2 39	1 44	0 49	0 06	1 02
10	3 58	3 03	2 08	1 13	0 18	0 38
11	4 22	3 27	2 32	1 37	0 41	0 14
12	4 46	3 51	2 55	2 01	1 04	0 10
13	5 09	4 14	3 19	2 24	1 28	0 33
14	5 33	4 38	3 43	2 57	1 52	0 56
15	5 56	5 01	4 06	3 10	2 15	1 19
16	6 19	5 24	4 29	3 32	2 38	1 41
17	6 42	5 46	4 51	3 55	3 00	2 04
18	7 05	6 09	5 14	4 18	3 23	2 27
19	7 28	6 32	5 37	4 41	3 46	2 50
20	7 51	6 55	5 00	5 04	4 08	3 12
21	8 13	7 17	6 22	5 27	4 30	3 34
22	8 36	7 40	6 45	5 50	4 53	3 57
23	8 58	8 03	7 07	6 12	5 15	4 19
24	9 21	8 25	7 30	6 34	5 38	4 42
25	9 43	8 47	7 52	6 56	6 00	5 04
26	10 05	9 09	8 14	7 18	6 22	5 26
27	10 26	9 31	8 35	7 50	6 43	5 47
28	10 48	9 53	8 57	8 01	7 04	6 08
29	11 09	10 14	9 18	8 22	7 25	6 29
30	11 31	10 35	9 39	8 43	7 46	6 50

South Latitude.

0	1	2	3	4	5	
D ′	D ′	D ′	D ′	D ′	D ′	
11 31	10 35	9 39	8 43	7 46	6 50	30
11 09	10 14	9 18	8 22	7 25	6 29	29
10 48	9 53	8 57	8 01	7 04	6 08	28
10 26	9 31	8 35	7 39	6 43	5 47	27
10 05	9 09	8 14	7 18	6 22	5 26	26
9 43	8 47	7 52	6 56	6 00	5 04	25
9 21	8 25	7 30	6 34	5 38	4 42	24
8 58	8 03	7 07	6 11	5 15	4 19	23
8 36	7 40	6 44	5 49	4 53	3 57	22
8 13	7 17	6 21	5 26	4 30	3 34	21
7 51	6 55	5 59	5 04	4 08	3 12	20
7 28	6 32	5 37	4 41	3 46	2 50	19
7 05	6 09	5 14	4 18	3 23	2 27	18
6 42	5 46	4 51	3 55	3 00	2 04	17
6 19	5 23	4 28	3 32	2 37	1 41	16
5 56	5 00	4 05	3 10	2 15	1 19	15
5 33	4 37	3 41	2 57	1 52	0 56	14
5 00	4 14	3 19	2 24	1 29	0 33	13
4 46	3 51	2 56	2 01	1 05	0 10	12
4 22	3 27	2 32	1 37	0 41	0 14	11
3 58	3 03	2 08	1 13	0 18	0 38	10
3 35	2 29	1 44	0 49	0 06	1 02	9
3 11	2 16	1 21	0 26	0 29	1 25	8
2 47	1 52	0 57	0 02	0 53	1 48	7
2 24	1 28	0 33	0 22	1 17	2 12	6
2 00	1 05	0 09	0 46	1 41	2 36	5
1 36	0 41	0 15	1 10	2 05	3 00	4
1 12	0 17	0 39	1 34	2 29	3 24	3
0 48	0 07	1 03	1 57	2 52	3 47	2
0 24	0 31	1 27	2 21	3 16	4 11	1
0 00	0 55	1 50	2 45	3 40	4 35.	♈

0	1	2	3	4	5	
0 00	0 55	1 50	2 45	3 40	4 35	30
0 24	1 19	2 14	3 09	4 04	4 59	29
0 48	1 43	2 38	3 33	4 28	5 23	28
1 12	2 07	3 02	3 57	4 52	5 47	27
1 36	2 31	3 26	4 21	5 16	6 11	26
2 00	2 55	3 50	4 45	5 50	6 35	25
2 24	3 19	4 14	5 09	6 04	6 59	24
2 47	3 43	4 38	5 33	6 28	7 23	23
3 11	4 07	5 02	5 57	6 02	7 47	22
3 35	4 30	5 25	6 20	7 15	8 10	21
3 58	4 54	5 48	6 44	7 39	8 34	20
4 22	5 18	6 12	7 08	8 03	8 58	19
4 46	5 42	6 36	7 32	8 27	9 22	18
5 09	6 05	7 00	7 55	8 50	9 46	17
5 33	6 29	7 24	8 19	9 14	10 10	16
5 56	6 52	7 47	8 42	9 37	10 33	15
6 19	7 14	8 09	9 05	10 00	10 56	14
6 42	7 37	8 32	9 28	10 23	11 19	13
7 05	8 00	8 56	9 51	10 46	11 42	12
7 28	8 23	9 18	10 14	11 09	12 05	11
7 51	8 46	9 42	10 38	11 33	12 28	10
8 13	9 05	10 09	11 01	11 56	12 51	9
8 36	9 32	10 28	11 23	12 19	13 14	8
8 58	9 55	10 51	11 46	12 42	13 37	7
9 21	10 17	11 13	12 08	13 04	14 00	6
9 43	10 39	11 35	12 3	13 26	14 22	5
10 05	11 01	11 57	12 52	13 48	14 44	4
10 26	11 23	12 19	13 14	14 10	15 06	3
10 48	11 45	12 41	13 36	14 32	15 28	2
11 09	12 05	13 02	13 57	14 53	15 49	1
11 31	12 27	13 23	14 19	15 15	16 11	♓

A Table of Declinations.

North Latitude.

	0		1		2		3		4		5	
	D	'	D	'	D	'	D	'	D	'	D	'
♏	11	31	10	35	09	39	08	43	07	46	06	50
1	11	52	10	56	10	00	09	04	08	07	07	11
2	12	13	11	17	10	20	09	24	08	28	07	31
3	12	33	11	37	10	40	09	44	08	48	07	51
4	12	54	11	58	11	01	10	04	09	08	08	11
5	13	14	12	18	11	21	10	24	09	28	08	31
6	13	34	12	38	11	41	10	44	09	48	08	51
7	13	54	12	58	12	01	11	04	10	07	09	10
8	14	14	13	17	12	20	11	23	10	26	09	29
9	14	33	13	36	12	39	11	42	10	45	09	48
10	14	52	13	55	12	58	12	01	11	04	10	07
11	15	11	14	14	13	17	12	20	11	23	10	25
12	15	29	14	32	13	35	12	38	11	41	10	43
13	15	48	14	50	13	53	12	56	12	59	11	01
14	16	06	15	08	14	11	13	14	12	17	11	19
15	16	24	15	26	14	29	13	31	12	34	11	36
16	16	41	15	43	14	46	13	48	12	51	11	53
17	16	58	16	00	15	03	14	05	13	08	12	10
18	17	15	16	17	15	20	14	22	13	24	12	26
19	17	32	16	34	15	36	14	38	13	40	12	42
20	17	48	16	50	15	52	14	54	13	56	12	58
21	18	04	17	06	16	08	15	10	14	12	13	14
22	18	20	17	22	16	24	15	26	14	28	13	29
23	18	35	17	37	16	39	15	41	14	43	13	44
24	18	50	17	52	16	54	15	56	14	58	13	59
25	19	05	18	07	17	09	16	10	15	12	14	13
26	19	19	18	21	17	23	16	25	15	26	14	27
27	19	33	18	35	17	36	16	38	15	39	14	41
28	19	47	18	48	17	50	16	51	15	52	14	54
29	20	00	19	01	18	03	17	04	16	05	15	07
30	20	13	19	14	18	16	17	17	16	17	15	20

♐	20	13	19	14	18	16	17	17	16	18	15	20
1	20	26	19	27	18	28	17	29	16	30	15	32
2	20	38	19	39	18	40	17	41	16	42	15	44
3	20	50	19	51	18	52	17	53	16	54	15	55
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8	21	43	20	44	19	45	18	46	17	47	16	47
9	21	53	20	54	19	55	18	56	17	56	16	57
10	22	02	21	03	20	04	19	05	18	05	17	06
11	22	10	21	11	20	12	19	13	18	13	17	14
12	22	19	21	19	20	20	19	21	18	21	17	22
13	22	27	21	27	20	28	19	28	18	29	17	29
14	22	34	21	35	20	35	19	35	18	36	17	36
15	22	41	21	41	20	41	19	41	18	42	17	42
16	22	47	21	47	20	47	19	47	18	48	17	48
17	22	53	21	53	20	53	19	53	18	54	17	54
18	22	59	21	59	20	59	19	59	19	00	18	00
19	23	04	22	04	21	04	20	04	19	05	18	05
20	23	09	22	09	21	09	20	09	19	10	18	10
21	23	13	22	13	21	13	20	13	19	14	18	14
22	23	17	22	17	21	17	20	17	19	17	18	17
23	23	20	22	20	21	20	20	20	19	20	18	20
24	23	23	22	23	21	23	20	23	19	23	18	23
25	23	26	22	26	21	26	20	26	19	26	18	26
26	23	28	22	28	21	28	20	28	19	28	18	28
27	23	30	22	30	21	30	20	30	19	30	18	30
28	23	30	22	31	21	31	20	31	19	31	18	31
29	23	31	22	31	21	31	20	31	19	31	18	31
30	23	31	22	31	21	31	20	31	19	31	18	31

South Latitude.

0		1		2		3		4		5		
D	'	D	'	D	'	D	'	D	'	D	'	
11	31	12	27	13	23	14	19	15	15	16	11	30
11	52	12	48	13	44	14	40	15	36	16	33	29
12	13	13	09	14	05	15	01	15	57	16	54	28
12	33	13	29	14	25	15	21	16	18	17	14	27
12	54	13	50	14	46	15	42	16	39	17	35	26
13	14	14	11	15	07	16	03	17	00	17	56	25
13	34	14	31	15	27	16	24	17	20	18	17	24
13	54	14	51	15	47	16	44	17	40	18	37	23
14	14	15	11	16	07	17	04	18	00	18	57	22
14	33	15	30	16	26	17	23	18	20	19	17	21
14	52	15	49	16	45	17	42	18	39	19	36	20
15	11	16	08	17	04	18	01	18	58	19	55	19
15	29	16	26	17	23	18	20	19	17	20	14	18
15	48	16	45	17	42	18	39	19	36	20	33	17
16	06	17	03	18	00	18	57	19	54	20	52	16
16	24	17	21	18	18	19	15	20	12	21	10	15
16	41	17	38	18	36	19	33	20	30	21	38	14
16	58	17	55	18	53	19	51	20	48	21	46	13
17	15	18	12	19	10	20	08	21	05	22	03	12
17	32	18	29	19	27	20	25	21	22	22	20	11
17	48	18	46	19	44	20	41	21	39	22	37	10
18	04	19	02	20	00	20	57	21	55	22	53	9
18	20	19	18	20	16	21	13	22	11	23	09	8
18	35	19	34	20	32	21	29	22	27	23	25	7
18	50	19	49	20	47	21	45	22	43	23	41	6
19	05	20	03	21	02	22	00	22	58	23	56	5
19	19	20	17	21	16	22	14	23	12	24	11	4
19	33	20	31	21	30	22	28	23	26	24	25	3
19	47	20	45	21	44	22	42	23	40	24	39	2
20	00	20	59	21	57	22	56	23	54	24	53	1
20	13	21	12	22	10	23	09	24	07	25	06	♒

20	13	21	12	22	10	23	09	24	07	25	06	30
20	26	21	25	22	23	23	22	24	20	25	19	29
20	38	21	37	22	36	23	35	24	33	25	32	28
20	50	21	49	22	48	23	47	24	45	25	44	27
21	01	22	00	22	59	23	58	24	57	25	55	26
21	12	22	11	23	10	24	09	25	03	26	07	25
21	23	22	22	23	21	24	20	25	19	26	18	24
21	33	22	32	23	31	24	31	25	30	26	29	23
21	43	22	42	23	41	24	41	25	40	26	39	22
21	53	22	52	23	51	24	51	25	50	26	49	21
22	02	23	01	24	0[illegible]	25	00	25	59	26	58	20
22	11	23	10	24	09	25	09	26	08	27	07	19
22	19	23	19	24	18	25	18	26	17	27	16	18
22	27	23	27	24	26	25	26	26	25	27	24	17
22	34	23	34	24	33	25	33	26	32	27	31	16
22	41	23	41	24	40	25	39	26	39	27	38	15
22	47	23	47	24	46	25	45	26	45	27	45	14
22	53	23	53	24	53	25	52	26	52	27	52	13
22	59	23	59	24	59	25	58	26	58	27	58	12
23	04	24	04	25	04	26	03	27	03	28	03	11
23	09	24	09	25	09	26	08	27	08	28	08	10
23	13	24	13	25	13	26	13	27	12	28	12	9
23	17	24	17	25	17	26	17	27	16	28	16	8
23	20	24	20	25	20	26	20	27	19	28	19	7
23	23	24	23	25	23	26	23	27	22	28	22	6
23	26	24	26	25	26	26	26	27	25	28	25	5
23	28	24	28	25	28	26	28	27	28	28	28	4
23	30	24	30	25	30	26	30	27	30	28	30	3
23	31	24	31	25	31	26	31	27	31	28	31	2
23	31	24	31	25	31	26	31	27	31	28	31	1
23	31	24	31	25	31	26	31	27	31	28	31	♑

A Table of the Oblique Ascensions of all the points of the Ecliptique, for the Latitude of 51d 32′

Deg.	♈ D	′	♉ D	′	♊ D	′	♋ D	′	♌ D	′	♍ D	′	♎ D	′	♏ D	′	♐ D	′	♑ D	′	♒ D	′	♓ D	′
0	0	0	13	4	30	12	56	48	94	36	137	15	180	0	222	45	265	24	303	12	329	48	346	56
1	0	24	13	32	30	54	57	54	95	55	138	42	181	25	224	10	266	47	304	17	330	29	347	25
2	0	49	14	1	31	38	59	1	97	24	140	8	182	50	225	36	268	9	305	21	331	11	347	53
3	1	14	14	30	32	21	60	8	98	46	141	34	184	15	227	2	269	32	306	24	331	51	348	21
4	1	39	15	1	33	6	61	16	100	10	143	0	185	40	228	28	370	54	307	27	332	30	348	49
5	2	4	15	30	33	50	62	25	101	35	144	26	187	6	229	54	272	16	308	29	333	9	349	16
6	2	29	16	0	34	35	63	35	102	55	145	52	188	30	231	20	273	37	309	30	333	47	349	44
7	2	54	16	31	35	22	64	46	104	23	147	17	189	56	232	46	274	57	310	30	334	25	350	11
8	3	19	17	2	36	8	65	57	105	48	148	43	191	21	234	13	276	17	311	29	335	2	350	38
9	3	45	17	33	36	57	67	10	107	13	150	9	192	46	235	39	277	36	312	27	335	40	351	5
10	4	10	18	5	37	46	68	22	108	38	151	34	194	12	237	5	278	56	313	24	336	17	351	32
11	4	36	18	37	38	35	69	35	110	3	153	0	195	37	238	32	280	14	314	21	336	52	351	58
12	5	1	19	10	39	26	70	49	111	29	154	25	197	2	239	57	281	32	315	16	337	27	352	25
13	5	26	19	42	40	16	72	3	112	54	155	51	198	28	241	23	282	51	316	11	338	2	352	51
14	5	52	20	14	41	8	73	19	114	21	157	16	199	53	242	49	284	8	317	6	338	38	353	17
15	6	17	20	48	42	1	74	35	115	46	158	44	201	16	244	14	285	25	317	59	339	12	353	43
16	6	43	21	22	42	54	75	52	117	11	160	7	202	44	245	39	286	41	318	52	339	46	354	8
17	7	9	21	58	43	49	77	9	118	37	161	32	204	9	247	6	287	57	319	44	340	18	354	34
18	7	35	22	33	44	44	78	28	120	3	162	58	205	35	248	31	289	11	320	34	340	50	354	59
19	8	2	23	8	45	39	79	46	121	28	164	23	207	0	249	57	290	25	321	25	341	23	355	24
20	8	28	23	43	46	36	81	4	122	55	165	48	208	26	251	22	291	38	322	14	341	55	355	50
21	8	55	24	20	47	33	82	24	124	21	167	14	209	51	152	47	292	50	323	3	342	27	356	15
22	9	22	24	58	48	31	83	43	125	47	168	39	211	17	254	12	294	3	323	52	342	58	356	41
23	9	49	25	35	49	30	85	3	127	14	170	4	212	43	255	37	295	14	324	38	343	29	357	6
24	10	16	26	13	50	30	86	23	128	40	171	30	214	8	257	1	296	25	325	25	344	0	357	31
25	10	44	26	51	51	31	87	44	130	6	172	54	215	34	258	25	297	35	326	10	344	30	357	56
26	11	11	27	30	52	33	89	6	131	32	174	20	217	0	259	50	298	44	326	54	344	59	358	21
27	11	39	28	9	53	36	90	28	232	58	175	45	218	26	261	14	299	52	327	39	345	30	358	46
28	12	7	28	49	54	39	91	51	134	24	177	10	219	52	262	36	300	59	328	22	345	59	359	11
29	12	35	29	31	55	43	93	13	135	50	178	35	221	18	264	1	302	6	329	6	346	28	359	36
30	13	4	30	12	56	48	94	36	137	15	180	0	222	45	255	24	303	12	329	48	346	56	360	0

Enter this Table, finding the *Sign* on the Head, and the Degree in the first Row on the left hand, and the common Angle will shew the Oblique Ascension of the point given in the Latitude of *London*.

A Table of Right Ascensions.

	North Latitude.						South Latitude.					
	0	1	2	3	4	5	0	1	2	3	4	5
	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♈	0 00	359 37	359 13	358 49	358 25	358 01	0 00	0 23	0 47	1 11	1 35	1 59
1	0 55	0 32	0 08	359 44	359 20	358 56	0 55	1 18	5 42	2 06	2 30	2 54
2	1 50	1 27	1 03	0 39	0 15	359 51	1 50	2 13	2 37	3 01	3 25	3 49
3	2 45	2 22	1 58	1 34	1 10	0 46	2 45	3 08	3 32	3 56	4 20	4 44
4	3 40	3 17	2 53	2 29	2 05	1 41	3 4	4 03	4 27	4 51	5 15	5 39
5	4 35	4 12	3 48	3 24	3 00	2 36	4 35	4 58	5 22	5 46	6 10	6 34
6	5 30	5 07	4 43	4 19	3 55	3 31	5 30	5 54	6 18	6 42	7 06	7 39
7	6 25	6 02	5 38	5 14	4 50	4 26	6 25	6 49	7 13	7 37	8 01	8 25
8	7 21	6 57	6 33	6 09	5 45	5 21	7 21	7 44	8 08	8 32	8 56	9 29
9	8 16	7 52	7 28	7 04	6 4	6 16	8 16	8 40	9 04	9 28	9 51	10 15
10	9 11	8 47	8 23	7 59	7 35	7 11	9 11	9 35	9 59	10 23	10 46	11 10
11	10 06	9 42	9 18	8 55	8 31	8 07	10 06	10 30	10 54	11 18	11 41	12 05
12	11 02	10 38	10 14	9 51	9 27	9 03	11 02	11 25	11 49	12 13	12 36	13 00
13	11 57	11 33	11 09	10 46	10 22	9 58	11 57	12 20	12 44	13 08	13 31	13 55
14	12 53	12 29	12 05	11 42	11 18	10 54	12 53	13 16	13 39	14 03	14 26	14 50
15	13 48	13 25	13 01	12 38	12 14	11 50	13 48	14 12	14 35	14 58	15 21	15 45
16	14 44	14 20	13 57	13 34	13 10	12 46	14 44	15 07	15 3	15 53	16 16	16 40
17	15 40	15 16	14 53	14 30	14 06	13 42	15 40	16 02	16 25	16 48	17 11	17 35
18	16 35	16 12	15 49	15 26	15 02	14 39	16 35	16 58	17 21	17 44	18 07	18 30
19	17 31	17 08	16 45	16 22	15 58	15 35	17 31	17 54	18 17	18 40	19 02	19 25
20	18 27	18 04	17 41	17 18	16 54	16 31	18 27	18 50	19 13	19 36	19 58	20 21
21	19 23	19 00	18 37	18 14	17 51	17 28	19 23	19 46	20 09	20 32	20 54	21 17
22	20 20	19 56	19 33	19 11	18 48	18 25	20 20	20 42	21 05	21 28	21 50	22 12
23	21 16	20 53	20 30	20 08	19 45	19 22	21 16	21 38	22 01	22 24	22 46	23 08
24	22 12	21 50	21 27	21 05	20 42	20 19	22 12	22 35	22 57	23 20	23 42	24 04
25	23 09	22 47	22 24	22 02	21 39	21 16	23 09	23 31	23 53	24 16	24 38	25 00
26	24 06	23 44	23 21	22 59	22 36	22 13	24 06	24 28	24 50	25 12	25 34	25 56
27	25 02	24 41	24 19	23 57	23 34	23 11	25 02	25 25	25 47	26 09	26 30	26 52
28	25 59	25 38	25 16	24 54	24 31	24 09	25 59	26 22	26 43	27 05	27 26	27 48
29	26 57	26 35	26 13	25 51	25 29	25 07	26 57	27 19	27 40	28 01	28 22	28 44
30	27 54	27 33	27 11	26 49	26 27	26 05	27 54	28 16	28 38	28 58	29 19	29 40
♉	27 54	27 33	27 11	26 49	26 27	26 05	27 54	28 16	29 37	28 58	29 19	29 40
1	28 51	28 30	28 08	27 47	27 25	27 03	28 51	29 13	29 34	29 55	30 16	30 37
2	29 49	29 27	29 06	28 45	28 23	28 01	29 49	30 1	30 31	30 52	31 13	31 34
3	30 46	30 25	30 04	29 43	29 21	28 59	30 46	31 07	31 28	31 49	32 10	32 31
4	31 43	31 23	31 02	30 41	30 19	29 58	31 44	32 05	32 25	32 46	33 07	33 27
5	32 42	32 22	32 00	31 39	31 18	30 57	32 42	33 03	33 23	33 43	34 04	34 24
6	33 40	33 20	32 58	32 38	32 17	31 56	33 40	34 01	34 21	34 41	35 01	35 21
7	34 38	34 18	33 58	33 37	33 16	32 55	34 38	34 59	35 19	35 39	35 58	36 18
8	35 36	35 17	34 57	34 36	34 15	33 54	35 37	35 57	36 17	36 37	36 56	37 15
9	36 34	36 16	35 56	35 36	35 15	34 54	36 36	36 56	37 15	37 35	37 54	38 13
10	37 33	37 15	36 55	36 35	36 15	35 54	37 35	37 54	38 13	38 33	38 52	39 11
11	38 33	38 14	37 54	37 35	37 15	36 54	38 34	38 53	39 12	39 31	39 50	40 09
12	39 32	39 14	38 54	38 35	38 15	37 55	39 33	39 52	40 11	40 30	40 48	41 07
13	40 31	40 13	39 54	39 35	39 15	38 56	40 32	40 51	41 10	41 28	41 46	42 05
14	41 31	41 13	40 54	40 35	40 16	39 57	41 31	41 50	42 09	42 27	42 45	43 03
15	42 31	42 13	41 54	41 36	41 17	40 58	42 31	42 50	43 08	43 26	43 44	44 02
16	43 31	43 13	42 54	42 36	42 18	41 59	43 31	43 49	44 07	44 25	44 43	45 00
17	44 31	44 13	43 55	43 37	43 19	43 00	44 31	44 49	45 06	45 24	45 42	45 59
18	45 31	45 14	44 56	44 38	44 20	44 01	45 31	45 49	46 06	46 23	46 41	46 58
19	46 32	46 14	45 57	45 39	45 21	45 03	46 32	46 49	47 06	47 23	47 40	47 57
20	47 32	47 15	46 58	46 40	46 23	46 05	47 32	47 49	48 06	48 23	48 39	48 56
21	48 33	48 16	47 59	47 42	47 25	47 07	48 33	48 50	49 06	49 23	49 39	49 55
22	49 34	49 17	49 00	48 44	48 27	48 09	49 34	49 5	50 06	50 23	50 38	50 54
23	50 35	50 18	50 02	49 46	49 29	49 12	50 35	50 51	51 06	51 23	51 38	51 53
24	51 36	51 20	51 04	50 48	50 32	50 15	51 36	51 52	52 07	52 23	52 38	52 53
25	52 38	52 22	52 06	51 51	51 35	51 18	52 38	52 53	53 08	53 23	53 38	53 53
26	53 40	53 24	53 09	52 54	52 38	52 22	53 4	53 55	54 09	54 24	54 38	54 53
27	54 42	54 27	54 12	53 57	53 42	53 26	54 42	54 56	55 11	55 25	55 39	55 53
28	55 44	55 29	55 15	55 00	54 45	54 39	55 44	55 58	56 12	56 26	56 40	56 54
29	56 46	56 32	56 18	56 03	55 49	55 34	56 46	57 00	57 13	57 27	57 41	57 54
30	57 48	57 35	57 21	57 07	56 53	56 38	57 48	18 02	58 15	58 29	58 42	58 55

A Table of Right Ascensions.

North Latitude.

	0 D	0 ′	1 D	1 ′	2 D	2 ′	3 D	3 ′	4 D	4 ′	5 D	5 ′
♊	57	48	57	35	57	21	57	07	56	53	56	38
1	58	51	58	38	58	24	58	10	57	57	57	42
2	59	53	59	41	59	27	59	14	59	01	58	47
3	60	56	60	44	60	31	60	18	60	05	59	52
4	61	59	61	47	51	35	61	22	61	10	60	57
5	63	03	62	51	62	39	62	27	62	15	62	02
6	64	06	63	55	63	43	63	32	63	20	63	08
7	65	09	64	59	64	47	64	37	64	25	64	13
8	66	13	66	03	65	52	65	42	65	30	65	19
9	67	17	67	07	66	57	66	47	66	36	66	25
10	68	21	68	11	68	02	66	42	67	42	67	31
11	69	25	69	16	69	07	68	57	68	48	68	38
12	70	29	70	21	70	12	70	03	69	54	69	45
13	71	34	71	26	71	17	71	09	71	00	70	51
14	72	38	72	31	72	22	72	15	72	06	71	58
15	73	42	73	36	73	28	73	21	73	19	73	05
16	74	47	74	41	74	33	74	27	74	19	74	12
17	75	52	75	46	75	39	75	33	75	26	75	19
18	76	57	76	51	76	45	76	39	76	33	76	27
19	78	02	77	56	77	51	77	45	77	40	77	34
20	79	07	79	02	78	57	78	52	78	47	78	41
21	80	12	80	08	80	03	79	59	79	54	79	49
22	81	17	81	13	81	09	81	05	81	01	80	56
23	82	22	82	18	82	15	82	11	82	08	82	04
24	83	28	83	24	83	21	83	18	83	15	83	12
25	84	33	84	30	84	27	84	25	84	22	84	20
26	85	38	85	36	85	33	85	32	85	29	85	28
27	86	44	86	42	86	40	86	39	86	37	86	36
28	87	49	87	48	87	46	87	46	87	44	87	44
29	88	55	88	54	88	53	88	53	88	52	88	52
30	90	00	90	00	90	00	90	00	90	00	90	00
♋	090	00	090	00	090	00	090	00	090	00	090	00
1	091	05	091	06	091	07	091	07	091	07	091	08
2	092	11	092	12	092	14	092	14	092	15	092	16
3	093	16	093	18	093	20	093	21	093	23	093	24
4	094	22	094	24	094	27	094	28	094	30	094	32
5	095	27	095	30	095	33	095	35	095	38	095	40
6	096	32	096	36	096	39	096	42	096	45	096	48
7	097	38	097	42	097	45	097	49	097	52	097	56
8	098	43	098	47	098	51	098	55	099	00	099	04
9	099	48	099	52	099	57	100	01	100	07	100	12
10	100	53	100	58	101	03	101	08	101	14	101	19
11	101	58	102	04	102	09	102	15	102	21	102	26
12	103	03	103	09	103	15	103	21	103	27	103	33
13	104	08	104	14	104	21	104	27	104	34	104	41
14	105	13	105	19	105	27	105	33	105	[illegible]	105	48
15	106	17	106	24	106	33	106	39	106	47	106	55
16	107	22	107	29	107	38	107	45	107	53	108	02
17	108	26	108	34	108	43	108	51	108	59	109	09
18	109	31	109	39	109	48	109	57	110	05	110	15
19	110	35	110	44	110	53	111	03	111	12	111	22
20	111	39	111	49	111	58	112	08	112	18	112	29
21	112	43	112	53	113	03	113	13	113	24	113	35
22	113	47	113	57	114	08	114	18	114	30	114	41
23	114	51	115	01	115	13	115	23	115	35	115	47
24	115	54	116	05	116	17	116	28	116	41	116	52
25	116	57	117	09	117	21	117	33	117	46	117	58
26	118	01	118	13	118	25	118	38	118	51	119	03
27	119	04	119	16	119	29	119	42	119	55	120	08
28	120	07	120	19	120	33	120	46	120	59	121	13
29	121	09	121	22	121	36	121	50	122	03	122	18
30	122	12	122	25	122	39	122	53	123	07	123	22

South Latitude.

	0 D	0 ′	1 D	1 ′	2 D	2 ′	3 D	3 ′	4 D	4 ′	5 D	5 ′
♊	57	48	58	02	58	15	58	29	58	42	58	53
1	58	51	59	04	59	17	59	30	59	43	59	55
2	59	53	60	06	60	19	60	31	60	44	60	56
3	60	56	61	09	61	21	61	33	61	46	61	57
4	61	59	62	11	62	23	62	35	62	48	62	58
5	63	03	63	14	63	25	63	37	63	50	63	59
6	64	06	64	17	64	28	64	39	64	52	65	01
7	65	09	65	20	65	31	65	41	65	54	66	02
8	66	13	66	23	66	34	66	44	66	56	67	04
9	67	17	67	27	67	37	67	46	67	58	68	06
10	68	21	68	30	68	40	68	49	68	59	69	07
11	69	25	69	34	69	43	69	52	70	01	70	09
12	70	29	70	38	70	46	70	55	71	03	71	11
13	71	34	71	42	71	49	71	58	72	05	72	13
14	72	38	72	46	72	53	73	01	73	08	73	15
15	73	43	73	50	73	57	74	04	74	11	74	18
16	74	47	74	54	75	01	75	07	75	14	75	20
17	75	52	75	58	76	05	76	11	76	17	76	23
18	76	57	77	03	77	09	77	15	77	20	77	26
19	78	02	78	07	78	13	78	18	78	23	78	28
20	79	07	79	12	79	17	79	21	79	26	79	31
21	80	12	80	17	80	21	80	25	80	29	80	34
22	81	17	81	21	81	25	81	28	81	32	81	36
23	82	22	82	25	82	29	82	32	82	35	82	39
24	83	28	83	30	83	33	83	36	83	39	83	42
25	84	33	84	35	84	37	84	40	84	42	84	45
26	85	38	85	40	85	41	85	44	85	45	85	48
27	86	44	86	45	86	46	86	48	86	49	86	51
28	87	49	87	50	87	50	87	52	87	52	87	54
29	88	55	88	55	88	55	88	56	88	56	88	57
30	90	00	90	00	90	00	90	00	90	00	90	00
♋	090	00	090	00	090	00	090	00	090	00	090	00
1	091	05	091	05	091	05	091	04	091	04	091	04
2	092	11	092	10	092	10	092	08	092	07	092	07
3	093	16	093	15	093	14	093	12	093	11	093	11
4	094	22	094	20	094	19	094	16	094	15	094	15
5	095	27	095	25	095	23	095	20	095	18	095	18
6	096	32	096	30	096	27	096	24	096	21	096	21
7	097	38	097	35	097	31	097	28	097	25	097	25
8	098	43	098	39	098	35	098	32	098	28	098	28
9	099	48	099	44	099	39	099	36	099	31	099	31
10	100	53	100	48	100	43	100	39	100	34	100	34
11	101	58	101	53	101	47	101	42	101	37	101	37
12	103	03	102	57	102	51	102	45	102	[illegible]	102	40
13	104	08	104	02	103	55	103	49	103	43	103	43
14	105	13	105	06	104	59	104	52	104	46	104	46
15	106	17	106	10	106	03	105	56	105	49	105	49
16	107	22	107	14	107	07	106	59	106	52	106	52
17	108	26	108	18	108	11	108	02	107	55	107	55
18	109	31	109	22	109	14	109	05	108	57	108	57
19	110	35	110	26	110	17	110	08	110	[illegible]	110	[illegible]
20	111	39	111	30	111	20	111	11	111	02	111	02
21	112	43	112	33	112	23	112	14	112	04	112	04
22	113	47	113	37	113	26	113	16	113	06	113	06
23	114	51	114	40	114	29	114	19	114	08	114	08
24	115	54	115	43	115	32	115	21	115	10	115	10
25	116	57	116	46	116	35	116	23	116	12	116	12
26	118	01	117	49	117	37	117	25	117	14	117	14
27	119	04	118	51	118	39	118	27	118	15	118	15
28	120	07	119	54	119	41	119	29	119	16	119	16
29	120	09	120	56	120	43	120	30	120	17	120	17
30	122	12	121	58	121	45	121	31	121	18	121	18

A Table of Right Ascensions.

North Latitude.

	0		1		2		3		4		5	
	D	'	D	'	D	'	D	'	D	'	D	'
♌	122	12	122	25	122	39	122	53	123	07	123	22
1	123	14	123	28	123	42	123	57	124	11	124	26
2	124	16	124	31	124	45	125	00	125	15	125	30
3	125	18	125	33	125	48	126	03	126	18	126	34
4	126	20	126	36	126	51	127	06	127	22	127	38
5	127	22	127	38	127	54	128	09	128	25	128	42
6	128	24	128	40	128	56	129	12	129	28	129	45
7	129	25	129	42	129	58	130	14	130	31	130	48
8	130	26	130	43	131	00	131	16	131	33	131	51
9	131	27	131	44	132	01	132	18	132	35	132	53
10	132	28	132	45	133	02	133	20	133	37	133	55
11	133	28	133	46	134	03	134	21	134	39	134	57
12	134	29	334	47	135	04	135	22	135	4	135	59
13	135	29	135	47	136	05	136	23	136	41	137	00
14	136	29	136	47	137	06	137	24	137	42	138	01
15	137	29	137	47	138	06	138	24	138	43	139	02
16	138	29	138	47	139	06	139	25	139	44	140	03
17	139	28	139	47	140	06	140	25	140	45	141	04
18	140	28	140	46	141	06	141	25	141	45	142	05
19	141	27	141	46	142	06	142	25	142	45	143	06
20	142	26	142	45	143	05	143	25	143	45	144	06
21	143	25	143	44	144	04	144	24	144	45	145	06
22	144	23	144	43	145	03	145	24	145	45	146	06
23	145	22	145	42	146	02	146	23	146	44	147	05
24	146	20	146	40	147	01	147	22	147	43	148	04
25	147	18	147	39	148	00	148	21	148	42	149	03
26	148	16	148	37	148	58	149	19	149	41	150	02
27	149	14	149	35	149	56	150	17	150	39	151	01
28	150	11	150	33	150	54	151	15	151	37	151	59
29	151	09	151	30	151	52	152	13	152	35	152	57
30	152	06	152	27	152	49	153	11	153	33	153	55
♍	152	06	152	27	152	49	153	11	153	33	153	55
1	153	04	153	25	153	47	154	09	154	31	154	53
2	154	01	154	22	154	44	155	06	155	29	155	51
3	154	58	155	19	155	41	156	03	156	26	156	49
4	155	54	156	16	156	39	157	01	157	24	157	47
5	156	51	157	13	157	36	157	58	158	21	158	44
6	157	47	158	10	158	33	158	55	159	18	159	41
7	158	44	159	07	159	30	159	52	160	15	160	38
8	159	40	160	04	160	27	160	49	161	12	161	35
9	160	37	161	00	161	23	161	46	162	09	162	32
10	161	33	161	56	162	19	162	42	163	06	163	29
11	162	29	162	52	163	15	163	38	164	02	164	25
12	163	25	163	48	164	11	164	34	164	58	165	21
13	164	20	164	44	165	07	165	30	165	54	166	18
14	165	16	165	4	166	06	166	26	166	50	167	14
15	166	12	166	35	166	59	167	22	167	46	168	1
16	167	07	167	31	167	55	168	18	168	42	169	06
17	168	03	168	27	168	51	169	14	169	38	170	02
18	168	58	169	23	169	46	170	09	170	33	170	57
19	169	54	170	18	170	42	171	05	171	29	171	53
20	170	49	171	13	171	37	172	01	172	25	172	49
21	171	44	172	08	172	32	172	56	173	2	173	44
22	172	39	173	03	173	27	173	51	174	15	174	39
23	173	35	173	58	174	22	174	46	175	10	175	34
24	174	30	174	53	175	17	175	41	176	05	176	29
25	175	25	175	48	176	12	176	36	177	00	177	24
26	176	20	176	43	177	07	177	31	177	55	178	19
27	177	15	177	38	178	02	178	26	178	50	179	14
28	178	10	178	33	178	57	179	21	179	45	180	09
29	179	05	179	28	179	52	180	16	180	4	181	04
3	180	00	180	23	180	47	181	11	181	35	181	59

South Latitude.

	0		1		2		3		4		5	
	D	'	D	'	D	'	D	'	D	'	D	'
♌	122	12	121	58	121	45	121	31	121	18	121	05
1	123	14	123	0	122	47	122	33	122	19	122	06
2	124	16	124	02	123	48	123	34	123	20	123	06
3	125	19	125	03	124	49	124	35	124	21	124	07
4	126	20	126	05	125	51	125	36	125	22	125	07
5	127	22	127	07	126	52	126	36	126	22	126	07
6	128	24	128	08	127	53	127	37	127	22	127	07
7	129	25	129	09	128	54	128	37	128	22	128	07
8	130	26	130	10	129	54	129	37	129	22	129	06
9	131	27	131	10	130	54	130	37	130	21	130	05
10	132	28	132	11	131	54	131	37	131	21	131	04
11	133	28	133	11	132	54	132	37	132	20	132	03
12	134	29	134	11	133	54	133	37	133	19	133	02
13	135	29	135	11	134	54	134	36	134	18	134	01
14	136	29	136	11	135	53	135	35	135	17	135	00
15	137	29	137	10	136	52	136	34	136	16	135	58
16	138	29	138	10	137	51	137	33	137	15	136	57
17	139	28	139	09	138	50	138	32	138	14	137	55
18	140	27	140	08	139	49	139	30	139	13	138	53
19	141	27	141	07	140	48	140	29	140	10	139	51
20	142	26	142	06	141	47	141	27	141	08	140	49
21	143	24	143	04	142	45	142	25	142	06	141	47
22	144	23	144	03	143	43	143	23	143	04	142	45
23	145	22	145	01	144	41	144	21	144	02	143	42
24	146	20	145	59	145	39	145	19	144	59	144	39
25	147	18	146	57	146	37	146	17	145	56	145	36
26	148	16	147	55	147	35	147	14	146	53	146	33
27	149	14	148	53	148	32	148	11	147	50	147	29
28	150	11	149	50	149	29	149	08	148	47	148	26
29	151	09	150	47	150	26	150	05	149	44	149	23
30	152	06	151	44	151	23	151	02	150	41	150	20
♍	152	06	151	44	151	23	151	02	150	41	150	20
1	153	04	152	41	152	20	151	59	151	38	151	16
2	154	01	153	38	153	17	152	55	152	34	152	12
3	154	58	154	35	154	13	153	51	153	30	153	08
4	155	54	155	32	155	10	154	48	154	26	154	04
5	156	51	156	29	156	07	155	44	155	22	155	00
6	157	48	157	25	157	03	156	40	156	18	155	56
7	158	44	158	22	157	59	157	36	157	14	156	52
8	159	40	159	18	158	55	158	32	158	10	157	48
9	160	37	160	14	159	51	159	28	159	06	158	43
10	161	33	161	1	160	47	160	24	160	02	159	39
11	162	29	162	06	161	43	161	20	160	58	160	35
12	163	25	163	02	162	39	162	16	161	53	161	30
13	164	20	163	58	163	35	163	12	162	49	162	25
14	165	16	164	53	164	30	164	07	163	44	163	20
15	166	12	165	48	165	25	165	02	164	39	164	15
16	167	07	166	44	166	21	165	57	165	34	165	10
17	168	03	167	4	167	17	165	52	166	29	166	05
18	168	58	168	35	168	12	167	47	167	24	167	00
19	169	54	169	31	169	07	168	43	168	19	167	55
20	170	49	170	26	170	02	169	38	169	14	168	50
21	171	44	171	21	170	57	170	33	170	09	169	45
22	172	39	172	16	171	52	171	28	171	04	170	40
23	173	35	173	11	172	47	172	23	171	59	171	35
24	174	30	174	06	173	42	173	18	172	54	172	30
25	175	25	175	02	174	38	174	14	173	5	173	26
26	176	20	175	57	175	33	175	09	174	45	174	21
27	177	15	176	52	176	28	176	04	175	4	175	16
28	178	10	177	47	177	23	176	59	176	35	176	11
29	179	05	178	42	178	18	177	54	177	30	177	06
3	180	0	179	37	179	19	178	49	178	25	178	0

Declinatio Australis

Note yt by adding only 180 degrees ♎ ♏ ♐ ♑ ♒ ♓
is ye same as ♈ ♉ ♊ ♋ ♌ ♍ for ye tutor

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 76 degrees of Latitude.

Elevation of the Pole.

S	D	1	2	3	4	5	6	7	8	9	10
		D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♈	0	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00
	4	003 38	003 36	003 35	003 33	003 32	003 29	003 28	003 26	003 24	003 23
	8	007 17	007 14	007 10	007 07	007 04	007 00	006 57	006 53	006 50	006 47
	12	010 57	010 52	010 46	010 41	010 26	010 52	010 26	010 21	010 16	010 11
	16	014 37	014 30	014 23	014 17	014 10	014 04	013 57	013 50	013 43	013 36
	20	018 19	018 10	018 02	017 54	017 46	017 37	017 29	017 20	017 12	017 03
	24	022 03	021 52	021 42	021 33	021 23	021 13	021 03	020 52	020 43	020 32
	28	025 48	025 37	025 25	025 14	025 03	024 50	024 39	024 28	024 16	024 04
♉	2	029 36	029 23	029 10	028 57	028 44	028 30	028 18	028 04	027 51	027 38
	6	033 26	033 11	032 57	032 43	032 27	032 13	031 59	031 43	031 29	031 14
	10	037 19	037 03	036 47	036 31	036 15	035 59	035 43	035 27	035 11	034 54
	14	041 14	040 57	040 39	040 22	040 05	039 47	039 30	039 12	038 55	038 37
	18	045 13	044 54	044 36	044 17	043 59	043 40	043 21	043 02	042 43	042 24
	22	049 15	048 54	048 35	048 15	047 55	047 35	047 15	046 55	046 34	046 14
	26	053 18	052 57	052 37	052 16	051 54	051 33	051 12	050 50	050 29	050 07
♊	0	057 26	057 04	056 42	056 20	055 57	055 35	055 12	054 50	054 28	054 05
	4	061 37	061 13	060 50	060 28	060 04	059 41	059 17	458 54	058 31	058 07
	8	065 50	065 25	065 02	064 38	064 13	063 50	063 25	063 02	062 37	062 12
	12	070 05	069 40	069 16	068 51	068 26	068 01	067 36	067 12	066 47	066 21
	16	074 22	073 57	073 32	073 07	072 41	072 16	071 51	071 25	070 59	070 32
	20	078 41	078 16	077 50	077 24	076 59	076 33	076 07	075 41	075 13	074 48
	24	083 01	082 36	082 10	081 44	081 18	080 52	080 25	079 59	079 32	079 05
	28	087 23	086 57	086 31	086 04	085 38	085 12	084 45	084 19	083 52	083 25
♋	2	091 45	091 19	090 53	090 27	090 01	089 35	089 07	088 41	088 14	087 47
	6	096 07	095 41	095 15	094 48	094 23	093 57	093 29	093 03	092 36	092 10
	10	100 27	100 02	099 36	099 10	098 45	098 19	097 53	097 27	097 00	096 34
	14	104 47	104 22	103 57	103 32	103 06	102 41	102 16	101 50	101 24	100 57
	18	109 06	108 41	108 17	107 52	107 27	107 03	106 38	106 13	105 48	105 22
	22	113 23	112 58	112 35	112 11	111 47	111 23	110 58	110 35	110 10	109 46
	26	117 38	117 14	116 51	116 28	116 05	115 42	115 18	114 55	114 32	114 08
♌	0	121 50	121 28	121 06	120 44	120 21	119 59	119 36	119 14	118 52	118 29
	4	125 59	125 38	125 13	124 56	124 35	124 14	123 52	123 31	123 10	122 48
	8	130 06	129 45	129 26	129 06	128 46	128 26	128 06	127 46	127 25	127 04
	12	134 10	133 51	133 32	133 14	132 55	132 36	132 18	131 58	131 39	131 20
	16	138 11	137 54	137 37	137 19	137 02	136 45	136 27	136 09	135 52	135 34
	20	142 09	141 53	141 37	141 21	141 05	140 49	140 33	140 17	140 01	139 45
	24	146 05	145 51	145 37	145 22	145 07	144 51	144 38	144 23	144 09	143 54
	28	149 58	149 46	149 32	149 19	149 06	148 52	148 40	148 27	148 13	148 01
♍	2	153 49	153 38	153 26	153 15	153 03	152 51	152 40	152 28	152 17	152 06
	6	157 38	157 28	157 18	157 08	156 59	156 48	156 39	156 28	156 18	156 08
	10	161 25	161 16	161 08	161 00	160 52	160 43	160 35	160 26	160 18	160 09
	14	165 10	165 04	164 56	164 50	164 44	164 37	164 30	164 23	164 16	164 09
	18	168 54	168 49	168 34	168 38	168 34	168 29	168 24	168 18	168 13	168 08
	22	172 37	172 33	172 30	172 26	172 23	172 20	172 16	172 13	172 09	172 06
	26	176 19	176 17	176 16	176 14	176 12	176 10	176 08	176 07	176 05	176 04
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	1	2	3	4	5	6	7	8	9	10
		D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00
	4	183 41	183 43	183 44	183 46	183 48	183 50	183 52	183 53	183 55	183 56
	8	187 23	187 27	187 30	187 34	187 37	187 40	187 44	187 47	187 51	187 54
	12	191 06	191 11	191 17	191 22	191 26	191 31	191 36	191 42	191 47	191 52
	16	194 50	194 56	195 04	195 10	195 16	195 23	195 30	195 37	195 44	195 51
	20	198 35	198 44	198 52	199 00	199 08	199 17	199 25	199 34	199 43	199 51
	24	202 22	202 30	202 42	202 52	203 01	203 12	203 21	203 32	203 42	203 52
	28	206 11	206 22	206 34	206 45	206 57	207 09	207 20	297 32	207 42	207 55
♏	2	210 02	210 14	210 28	210 41	210 54	211 08	211 20	211 33	211 46	211 59
	6	213 55	214 09	214 23	214 38	214 53	215 09	215 22	215 37	215 51	216 06
	10	217 51	218 07	218 23	218 39	218 55	119 11	219 27	219 43	219 59	220 15
	14	221 49	222 06	222 23	222 41	222 58	223 15	223 33	223 51	224 08	224 26
	18	225 50	226 09	226 28	226 46	227 05	227 24	227 42	228 01	228 21	228 40
	22	229 54	230 15	230 34	230 54	231 14	231 34	231 54	232 14	232 35	232 56
	26	224 01	234 22	234 42	235 04	235 25	235 46	236 08	236 29	236 50	237 12
♐	0	238 10	238 32	238 54	239 16	239 39	240 01	240 24	240 46	241 08	241 31
	4	242 22	242 46	243 09	243 32	243 55	244 18	244 42	245 05	245 25	245 52
	8	246 37	247 02	247 25	247 49	248 13	248 37	249 02	249 25	249 50	250 14
	12	250 54	251 19	251 43	252 08	252 33	252 57	253 22	253 47	254 12	254 38
	16	255 13	255 38	256 03	256 28	256 54	257 19	257 44	258 10	258 36	359 02
	20	259 33	259 58	260 24	260 50	261 15	261 41	262 07	262 33	263 00	263 26
	24	263 53	264 19	264 45	265 12	265 37	266 03	266 31	266 57	267 24	267 50
	28	268 15	268 41	269 07	269 33	269 59	270 25	270 53	271 19	271 46	272 13
♑	2	272 37	273 03	273 29	273 56	274 22	274 48	275 15	275 41	276 08	276 35
	6	276 59	277 24	277 50	278 16	278 42	279 08	279 35	280 01	280 28	280 55
	10	281 19	281 44	282 10	282 36	283 01	283 27	283 53	284 19	284 47	285 12
	14	285 38	286 03	286 28	286 53	287 19	287 44	288 09	288 35	289 01	289 28
	18	289 55	290 20	290 44	291 09	291 34	291 59	292 24	292 48	293 13	293 39
	22	294 10	294 35	294 58	295 22	295 47	296 10	296 35	296 58	297 23	297 48
	26	298 23	298 47	299 10	299 32	299 56	300 19	300 43	301 06	301 29	301 53
♒	0	302 34	302 56	303 18	303 40	304 03	304 25	304 48	305 10	305 32	305 55
	4	306 42	307 03	307 23	307 44	308 06	308 27	308 48	309 10	309 31	309 53
	8	310 45	311 06	311 25	311 45	312 05	312 25	312 45	313 05	313 26	313 46
	12	314 47	315 06	315 24	315 43	316 01	316 20	316 39	316 58	317 17	317 36
	16	318 46	319 03	319 21	319 38	319 55	320 13	320 30	320 48	321 05	321 23
	20	322 41	322 57	323 13	323 29	323 45	324 01	324 17	324 33	324 49	325 06
	24	326 34	326 49	327 03	327 17	327 33	327 47	328 01	328 17	328 31	328 46
	28	330 24	330 37	331 50	331 03	331 16	331 30	331 42	331 56	332 09	332 22
♓	2	334 12	334 23	334 35	334 46	334 57	335 10	335 21	335 32	335 44	335 56
	6	337 57	338 08	338 18	338 27	338 37	338 47	338 57	339 08	339 17	339 28
	10	341 41	341 50	341 58	342 06	342 14	342 23	342 31	342 40	342 48	342 57
	14	345 23	345 30	345 37	345 53	345 50	345 56	346 03	346 10	346 17	346 24
	18	349 03	349 08	349 14	349 19	349 24	349 28	349 34	349 39	349 44	349 49
	22	352 43	352 46	352 50	352 53	352 56	353 00	353 03	353 07	353 10	353 13
	26	356 22	356 24	356 25	356 27	356 28	356 31	356 32	356 34	356 36	356 37
	30	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00

A Table of the Oblique Aſcenſions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	11	12	13	14	15	16	17	18	19	20
		D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♈	0	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00
	4	003 21	003 20	003 17	003 16	003 14	003 12	003 10	003 08	003 07	003 05
	8	006 43	006 40	006 36	006 33	006 29	006 26	006 22	006 18	006 15	006 11
	12	010 06	010 00	009 56	009 50	009 45	009 40	009 34	009 28	009 23	009 17
	16	013 30	013 22	013 16	013 09	013 01	012 55	012 47	012 40	012 32	012 25
	20	016 55	016 46	016 38	016 29	016 20	016 11	016 02	015 53	015 44	015 35
	24	020 23	020 12	020 02	019 51	019 40	019 30	019 19	019 09	018 58	018 47
	28	023 52	023 40	023 28	023 16	023 04	022 51	022 39	022 27	022 14	022 01
♉	2	027 24	027 11	026 57	026 43	026 29	026 15	026 02	025 47	025 33	025 18
	6	030 59	030 44	030 28	030 13	029 58	029 42	029 27	029 10	028 55	028 39
	10	034 38	034 21	034 04	033 48	033 31	033 13	032 56	032 38	032 21	032 03
	14	038 19	038 01	037 43	037 24	037 06	036 47	036 28	036 09	035 50	035 31
	18	042 05	041 45	041 26	041 06	040 46	040 26	040 05	039 44	039 24	039 03
	22	045 54	045 32	045 12	044 50	044 29	044 08	043 46	043 24	043 02	042 40
	26	049 46	049 23	049 01	048 39	048 17	047 54	047 31	047 07	046 44	046 20
♊	0	053 42	053 19	052 55	052 32	052 09	051 45	051 20	050 56	050 31	050 06
	4	057 43	057 19	056 55	056 30	056 05	055 41	055 15	054 50	054 24	053 58
	8	061 48	061 22	060 58	060 32	060 06	059 40	059 15	058 48	058 21	057 54
	12	065 56	065 30	065 04	064 38	064 12	063 45	063 17	062 50	062 23	061 55
	16	070 07	069 41	069 14	068 48	068 21	067 53	067 25	066 57	066 29	066 01
	20	074 21	073 55	073 28	072 00	072 33	072 05	071 37	071 09	070 40	070 11
	24	078 38	078 11	077 44	077 16	076 49	076 21	075 53	075 24	074 55	074 25
	28	082 58	082 31	082 04	081 36	081 08	080 40	080 12	079 43	079 13	078 44
♋	2	087 20	086 53	086 25	085 57	085 30	085 01	084 33	084 04	083 35	083 05
	6	091 43	091 16	090 49	090 21	089 54	089 25	088 57	088 28	087 59	087 29
	10	096 07	095 41	095 14	094 46	094 19	093 51	093 23	092 55	092 26	091 57
	14	100 31	100 06	099 39	099 12	098 46	098 18	097 50	097 22	096 54	096 25
	18	104 57	104 31	104 05	103 39	103 13	102 46	102 18	101 52	101 24	100 55
	22	109 21	108 55	108 31	108 05	107 40	107 14	106 48	106 21	105 55	105 26
	26	113 44	113 19	112 55	112 31	112 06	111 41	111 16	110 51	110 25	109 58
♌	0	118 06	117 43	117 19	116 56	116 33	116 09	115 44	115 20	114 55	114 30
	4	122 26	122 04	121 42	121 20	120 57	120 35	120 12	119 48	119 25	119 01
	8	126 45	126 23	126 02	125 42	125 20	124 59	124 37	124 15	123 53	123 31
	12	131 01	130 41	130 22	130 02	129 42	123 22	129 02	128 41	128 20	128 00
	16	135 16	134 58	134 40	134 22	134 03	133 44	133 26	133 06	132 47	132 28
	20	139 28	139 11	138 54	138 38	138 21	138 03	137 46	137 28	137 11	136 53
	24	143 39	143 23	143 08	142 53	142 37	142 22	142 06	141 50	141 35	141 18
	28	147 47	147 33	147 19	147 05	146 52	146 38	146 24	146 10	145 55	145 41
♍	2	151 53	151 41	151 29	151 17	151 04	150 52	150 40	150 28	150 15	150 02
	6	155 58	155 48	155 37	155 27	155 16	155 06	154 55	154 44	154 34	154 22
	10	160 01	159 52	159 44	159 35	159 26	159 17	159 08	158 59	158 50	158 41
	14	164 03	163 56	163 49	163 42	163 34	163 28	163 20	163 13	163 06	162 58
	18	168 03	167 58	167 53	167 48	167 42	167 37	167 31	167 25	167 20	167 14
	22	172 03	171 59	171 56	171 52	171 49	171 45	171 41	171 37	171 34	171 30
	26	176 02	176 00	175 58	175 56	175 55	175 53	175 59	175 49	175 48	175 46
	30	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

	11	12	13	14	15	16	17	18	19	20
S D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♎ 0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00
4	183 58	184 00	184 02	184 04	184 05	184 07	184 09	184 11	184 12	184 14
8	187 57	188 01	188 04	188 08	188 11	188 15	188 19	188 23	188 26	188 30
12	191 57	192 02	192 07	192 12	192 18	192 23	192 29	192 35	192 40	192 46
16	195 57	196 04	196 11	196 18	196 26	196 32	196 40	196 47	196 54	197 02
20	199 59	200 08	200 16	200 25	200 34	200 43	200 52	201 01	201 10	201 19
24	204 02	204 12	204 23	204 33	204 44	204 55	205 05	205 16	205 26	205 38
28	208 07	208 19	208 31	208 43	208 56	209 08	209 20	209 32	209 45	209 58
♏ 2	212 13	212 27	212 41	212 55	213 08	213 22	213 36	213 50	214 05	214 19
6	216 21	216 37	216 52	217 07	217 23	217 38	217 54	218 10	218 25	218 42
10	220 32	220 49	221 06	221 22	221 39	221 57	222 14	222 32	222 49	223 07
14	224 44	225 02	225 20	225 38	225 57	226 16	226 34	226 54	227 13	227 32
18	228 59	229 19	229 38	229 58	230 18	230 38	230 58	231 19	231 40	232 00
22	233 15	233 37	233 58	234 18	234 40	235 01	235 23	235 45	236 07	236 29
26	237 34	237 56	238 18	238 40	239 03	239 26	239 48	240 12	240 35	240 59
♐ 0	241 54	242 17	242 41	243 04	243 27	243 51	244 16	244 40	245 05	245 30
4	246 16	246 41	247 05	247 29	247 54	248 19	248 44	249 09	249 35	250 02
8	250 39	251 05	251 29	251 55	252 20	252 46	253 12	253 39	254 05	254 34
12	255 03	255 29	255 55	256 21	256 47	257 14	257 42	258 08	258 36	259 05
16	259 29	259 54	260 21	260 48	261 14	261 42	262 10	262 38	263 06	263 35
20	263 53	264 19	264 46	265 14	265 41	266 09	266 37	267 05	267 34	268 03
24	268 17	268 44	269 11	269 39	270 06	270 35	271 03	271 32	272 01	272 31
28	272 40	273 07	273 35	274 03	274 30	274 59	275 27	275 56	276 25	276 55
♑ 2	277 02	277 29	277 56	278 24	278 52	279 20	279 48	280 17	280 47	281 16
6	281 22	281 49	282 16	282 44	283 11	283 39	284 07	284 36	285 05	285 35
10	285 39	286 05	286 32	287 00	287 27	287 55	288 23	288 51	289 20	289 49
14	289 53	290 19	290 46	291 12	291 39	292 07	292 35	293 03	293 31	293 59
18	294 04	294 30	294 56	295 22	295 48	296 15	296 43	297 10	297 57	298 05
22	298 12	298 38	299 02	299 28	299 54	300 20	300 45	301 12	301 39	302 06
26	302 17	302 41	303 05	303 30	303 55	304 19	304 45	305 10	305 36	306 02
♒ 0	306 18	306 41	307 05	307 28	307 51	308 15	308 40	309 04	309 29	309 54
4	310 14	310 37	310 59	311 21	311 43	312 06	312 29	312 53	313 16	313 40
8	314 06	314 28	314 48	315 10	315 31	315 55	316 14	316 36	316 58	317 20
12	317 55	318 15	318 37	318 54	319 14	319 34	319 55	320 16	320 36	320 57
16	321 41	321 59	322 17	322 36	322 54	323 13	323 32	323 51	324 10	324 29
20	325 22	325 39	325 56	326 12	326 29	326 47	327 04	327 22	327 39	327 57
24	329 01	329 16	329 32	329 47	330 02	330 18	330 33	330 50	331 05	331 21
28	332 36	332 49	333 03	333 17	333 31	333 45	333 58	334 13	334 27	334 42
♓ 2	336 08	336 20	336 32	336 44	336 56	337 09	397 21	337 33	337 46	337 59
6	339 37	339 48	339 58	340 09	340 20	340 30	340 41	340 51	341 02	341 13
10	343 05	343 14	343 22	343 31	343 40	343 49	343 58	344 07	344 16	344 25
14	346 30	346 38	346 44	346 51	346 59	347 05	347 13	347 20	347 28	347 35
18	349 54	350 00	350 04	350 10	350 15	350 20	350 26	350 32	350 37	350 43
22	353 17	353 20	353 24	353 27	353 31	353 34	353 38	353 42	353 45	353 49
26	356 39	356 40	356 43	356 44	356 46	356 48	356 50	356 52	356 53	356 50
30	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

		21	22	23	24	25	26	27	28	29	30
S	D	D '	D '	D '	D '	D '	D '	D '	D '	D '	D '
♈	0	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00
	4	003 03	003 01	002 59	002 57	002 53	002 57	002 51	002 48	002 47	002 44
	8	006 07	006 03	005 59	005 55	005 51	005 47	005 43	005 38	005 35	005 30
	12	009 11	009 06	009 00	008 54	008 48	008 42	008 35	008 29	008 23	008 16
	16	010 17	012 10	012 02	011 54	011 46	011 38	011 30	011 21	011 12	011 04
	20	015 25	015 16	015 06	014 56	014 46	014 36	014 26	014 15	014 04	013 54
	24	018 35	018 24	018 12	018 00	017 49	017 36	017 24	017 11	016 59	016 46
	28	021 48	021 35	021 21	021 08	020 54	020 40	020 25	020 11	019 55	019 41
♉	2	025 03	024 48	024 33	024 18	024 01	023 46	023 29	023 13	022 55	022 39
	6	028 21	028 05	027 48	027 31	027 13	026 55	026 37	026 18	026 00	025 40
	10	031 44	031 26	031 07	031 48	030 29	030 09	029 49	029 29	029 08	028 47
	14	035 10	034 50	034 30	034 09	033 49	033 27	033 04	032 43	032 19	031 57
	18	038 41	038 20	037 57	037 36	037 13	036 50	036 26	036 02	035 37	035 13
	22	042 17	041 54	041 30	041 06	040 42	040 17	039 53	039 27	039 00	038 34
	26	045 56	045 32	045 07	044 41	044 15	043 50	043 22	042 56	042 28	042 00
♊	0	049 41	049 15	048 49	048 22	047 54	047 28	047 00	046 31	046 02	045 32
	4	053 32	053 04	052 38	052 09	051 41	051 12	050 43	050 13	049 43	049 12
	8	057 27	056 58	056 30	056 01	055 32	055 02	054 32	054 00	053 29	052 57
	12	061 27	060 58	060 28	059 59	059 29	058 58	058 26	057 54	057 21	056 49
	16	065 32	065 03	064 32	064 01	063 31	062 59	062 27	061 55	061 20	060 47
	20	069 41	069 11	068 40	068 09	067 38	067 06	066 33	066 00	065 26	064 51
	24	073 55	073 25	072 54	072 22	071 50	071 18	070 45	070 11	069 37	069 02
	28	078 13	077 42	077 12	076 40	076 08	075 35	075 02	074 28	073 53	073 18
♋	2	082 35	082 04	081 34	081 02	080 30	079 57	079 24	078 50	078 15	077 40
	6	086 59	086 29	085 58	085 27	084 55	084 23	083 50	083 16	082 41	082 06
	10	091 27	090 57	090 20	089 55	089 24	088 52	088 19	087 46	087 12	086 37
	14	095 56	095 29	094 57	094 26	093 56	093 24	092 51	092 19	091 45	091 11
	18	100 28	099 59	099 29	098 59	099 29	097 59	097 27	096 55	096 21	095 49
	22	105 00	104 31	104 03	103 34	103 05	102 35	102 05	101 33	101 02	100 29
	26	109 32	109 05	108 38	108 10	107 41	107 12	106 44	106 13	105 43	105 12
♌	0	114 05	113 39	113 13	112 46	112 18	111 52	111 24	110 55	110 26	109 56
	4	118 37	118 12	117 48	117 22	116 56	116 31	116 04	115 37	115 09	114 4[illegible]
	8	123 08	122 44	122 21	121 57	121 33	121 09	120 43	120 18	119 51	119 24
	12	127 38	127 16	126 54	126 32	126 10	125 47	125 23	124 59	124 34	124 09
	16	132 07	131 48	131 27	131 06	130 46	130 24	130 02	129 40	129 17	128 54
	20	136 34	136 16	135 57	135 38	135 19	134 59	134 39	134 19	133 58	133 37
	24	141 01	140 44	140 28	140 10	139 52	139 45	139 17	138 58	138 39	138 2[illegible]
	28	145 25	145 11	144 56	144 40	144 24	144 08	143 52	143 39	143 18	143 01
♍	2	149 49	149 35	149 22	149 08	148 55	148 40	148 26	148 11	147 57	147 41
	6	154 11	153 59	153 48	153 36	153 24	153 12	153 00	152 47	152 34	152 21
	10	158 31	158 22	158 12	158 02	157 52	157 47	157 32	157 21	157 1[illegible]	157 01
	14	162 51	162 43	162 36	166 27	162 20	162 11	162 03	161 54	161 46	161 37
	18	167 09	167 03	166 58	166 51	166 46	166 39	166 33	166 26	166 20	166 13
	22	171 26	171 23	171 19	171 15	171 11	171 07	171 02	170 58	170 54	170 49
	26	175 44	175 42	175 40	175 38	175 36	175 34	175 32	175 29	175 28	175 25
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	[illegible]

A Table of the Oblique Ascensions of the *Ecliptique* from 0. to 67 degrees of Latitude.

Elevation of the Pole.

		21	22	23	24	25	26	27	28	29	30
S	D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00
	4	184 16	184 18	184 20	184 21	184 24	184 26	184 28	184 31	184 32	184 35
	8	188 34	188 37	188 41	188 45	188 49	188 53	188 58	189 02	189 06	189 11
	12	192 51	192 57	193 02	193 09	193 14	193 21	193 27	193 34	193 40	193 47
	16	197 09	197 17	197 24	197 33	197 40	197 49	197 57	198 06	198 14	198 23
	20	201 29	201 38	201 48	201 58	202 08	202 18	202 28	202 38	202 50	202 59
	24	205 49	206 01	206 12	206 24	206 36	206 48	207 00	207 13	207 26	207 39
	28	210 11	210 25	210 38	210 52	211 05	211 20	211 34	211 49	212 03	212 19
♏	2	214 35	214 49	215 04	215 20	215 36	215 52	216 08	216 25	216 42	216 59
	6	218 59	219 16	219 32	219 50	220 08	220 25	220 43	221 02	221 21	221 40
	10	223 26	223 44	224 03	224 22	324 41	225 01	225 21	225 41	226 02	226 23
	14	227 53	228 12	228 33	228 54	229 14	229 36	229 58	230 20	230 43	231 06
	18	232 22	232 44	233 06	233 08	233 50	234 13	234 37	235 01	235 26	235 51
	22	236 52	237 16	237 39	238 03	238 27	238 51	239 17	239 42	240 09	240 36
	26	241 23	241 48	242 12	242 38	243 04	243 29	243 56	244 23	244 51	245 20
♐	0	245 55	246 21	246 47	247 14	247 42	248 08	248 36	249 05	249 34	250 04
	4	250 28	250 55	251 22	251 50	252 19	252 48	253 16	253 47	254 17	254 48
	8	255 00	255 29	255 57	256 26	256 55	257 15	257 55	258 27	258 58	259 31
	12	259 32	260 01	260 31	261 01	261 31	262 01	262 33	263 05	263 38	264 11
	16	264 04	264 33	265 03	265 34	266 04	266 36	267 09	267 41	268 15	268 49
	20	268 33	269 03	269 34	270 05	270 36	271 08	271 41	272 14	272 48	273 23
	24	273 01	273 31	274 02	274 33	274 05	275 37	276 10	276 44	277 19	277 54
	28	277 25	277 50	278 26	278 58	279 30	280 03	280 36	281 10	281 45	282 20
♑	2	281 47	282 18	282 48	283 20	283 52	284 25	284 58	285 32	286 07	286 42
	6	286 05	286 35	287 06	287 38	288 10	288 42	289 15	289 49	290 23	290 58
	10	290 19	290 49	291 20	291 51	292 22	292 54	293 27	294 00	294 34	295 09
	14	294 28	294 57	295 28	295 59	296 29	297 01	297 33	298 05	298 40	299 13
	18	298 33	299 02	299 32	300 01	300 31	301 02	301 34	302 06	302 39	303 11
	22	302 33	303 02	303 30	303 59	304 28	304 59	305 28	306 00	306 31	307 03
	26	306 28	306 56	307 22	307 51	308 19	308 48	309 17	309 47	310 17	310 48
♒	0	310 19	310 45	311 11	311 38	312 06	312 32	313 00	313 29	313 58	314 28
	4	314 04	314 28	314 53	315 19	315 45	316 10	316 38	317 04	317 32	318 00
	8	317 43	318 06	318 30	318 54	319 18	319 43	320 07	320 33	321 00	321 26
	12	321 19	321 40	322 03	322 24	322 47	323 10	323 34	323 58	324 23	324 47
	16	324 50	325 10	325 30	325 51	326 11	326 33	326 56	327 17	327 41	328 03
	20	328 16	328 34	328 53	329 12	329 31	329 51	330 11	330 31	330 52	331 13
	24	331 39	331 55	332 12	332 29	332 47	333 05	333 23	333 42	334 00	334 20
	28	334 57	335 12	335 29	335 42	335 59	336 14	336 31	336 47	337 05	337 21
♓	2	338 12	338 25	338 39	338 52	339 06	339 20	339 35	339 49	340 05	340 19
	6	341 25	341 36	341 48	342 00	342 11	342 24	342 36	342 49	343 01	343 14
	10	344 35	344 44	344 54	345 04	345 14	345 24	345 34	345 45	345 56	346 06
	14	347 43	347 50	347 58	348 06	348 14	348 22	348 30	348 39	348 48	348 56
	18	350 49	350 54	351 00	351 06	351 12	351 18	351 25	351 31	351 37	351 44
	22	353 53	353 57	354 01	354 05	354 09	354 13	354 17	354 22	354 25	354 30
	26	356 57	356 59	357 01	357 03	357 05	357 07	357 09	357 12	357 13	357 16
	30	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

	31	32	33	34	35	36	37	38	39	40
S D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♈ 0	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00
4	002 42	002 40	002 37	002 35	002 32	002 30	002 28	002 25	002 22	002 2[illegible]
8	005 26	005 21	005 16	005 11	005 06	005 02	004 56	004 51	004 46	004 40
12	008 10	008 03	007 56	007 48	007 41	007 34	007 26	007 18	007 10	007 01
16	010 55	010 46	010 36	010 27	010 17	010 07	009 57	009 46	009 35	009 24
20	013 42	013 31	013 19	013 07	012 55	012 43	012 30	012 17	012 03	011 48
24	016 32	016 19	016 04	015 51	015 35	015 21	015 06	014 49	014 34	014 16
28	019 25	019 10	018 52	018 37	018 19	018 02	017 45	017 25	017 07	016 48
♉ 2	022 21	022 04	021 44	021 26	021 07	020 46	020 27	020 05	019 44	019 22
6	025 20	025 01	024 40	024 19	023 57	023 35	023 12	022 49	022 25	022 00
10	028 25	028 03	027 40	027 17	026 53	026 29	026 03	025 38	025 11	024 44
14	031 33	031 09	030 44	030 19	029 53	029 26	028 58	028 31	028 02	027 32
18	034 47	034 21	033 54	033 27	032 59	032 30	032 00	031 30	03[illegible] 58	030 26
22	038 06	037 39	037 10	036 41	036 10	035 40	035 08	034 35	034 02	033 27
26	041 31	041 02	040 31	040 00	039 52	038 56	038 21	037 46	037 11	036 34
♊ 0	045 02	044 31	043 59	043 26	042 52	042 18	041 42	041 06	040 28	039 49
4	048 40	048 07	047 33	047 00	046 24	045 48	045 11	044 32	043 54	043 12
8	052 24	051 50	051 15	050 40	050 03	049 25	048 47	048 06	047 26	046 43
12	056 14	055 38	055 03	054 26	053 49	053 09	052 30	051 49	051 06	050 23
16	060 12	059 36	058 59	058 21	057 42	057 03	056 22	055 39	054 56	054 11
20	064 15	063 39	063 01	062 23	061 43	061 03	060 21	059 38	058 53	058 07
24	068 25	067 48	067 10	066 31	065 51	065 10	064 28	063 44	062 59	062 12
28	072 41	072 04	071 26	070 47	070 05	069 24	068 42	067 58	067 13	066 26
♋ 2	077 02	076 25	075 48	075 09	074 28	073 47	073 04	072 20	071 35	070 47
6	081 29	080 53	080 15	079 36	078 56	078 15	077 33	076 49	076 04	075 17
10	086 01	085 25	084 47	084 09	083 29	082 49	082 07	081 24	080 39	079 53
14	090 37	090 01	089 23	088 46	088 07	087 28	086 46	086 04	085 21	084 35
18	095 16	094 40	094 04	093 28	092 50	092 11	091 31	090 50	090 08	089 29
22	099 57	099 23	098 48	098 13	097 36	046 58	096 19	095 40	094 59	094 17
26	104 40	104 07	103 34	103 00	102 24	101 49	101 11	100 33	099 54	099 13
♌ 0	109 26	108 55	108 23	107 50	107 16	106 42	106 06	105 30	104 52	104 13
4	114 11	113 42	113 11	112 40	112 08	111 36	111 52	110 27	109 52	109 15
8	118 57	118 29	118 01	117 31	117 01	116 30	115 59	115 26	114 53	114 18
12	123 43	123 17	122 51	122 23	121 55	121 26	120 57	120 27	119 55	119 22
16	128 31	128 06	127 42	127 16	126 51	126 23	125 56	125 28	124 59	124 28
20	133 15	132 53	132 30	132 07	131 43	131 19	130 53	130 28	130 01	129 34
24	138 00	137 41	137 19	136 59	136 37	136 15	135 52	135 28	135 05	134 41
28	142 44	142 26	142 07	141 49	141 29	141 09	140 49	140 28	140 07	139 44
♍ 2	147 26	147 10	146 54	146 38	146 21	146 03	145 45	145 27	145 08	144 48
6	152 08	151 54	151 40	151 26	151 11	150 57	150 41	150 25	150 09	149 52
10	156 48	156 37	156 25	156 13	156 01	155 49	155 36	155 23	155 09	154 54
14	161 28	161 19	161 09	161 00	160 50	160 41	160 30	160 19	160 09	159 57
18	166 07	166 00	165 53	165 46	165 38	165 31	165 23	165 15	165 07	164 59
22	170 48	170 40	170 36	170 31	170 26	170 21	170 16	170 10	170 05	170 00
26	175 23	175 20	175 18	175 16	175 13	175 11	175 08	175 06	175 03	175 00
30	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00

A Table of the Oblique Ascensions of the *Ecliptique* from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	31 D '	32 D '	33 D '	34 D '	35 D '	36 D '	37 D '	38 D '	39 D '	40 D '
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 ço	180 00
	4	184 37	184 40	184 42	184 44	184 47	184 49	184 52	184 54	184 57	185 00
	8	189 15	189 20	189 24	189 29	189 34	189 39	189 44	189 50	189 55	190 00
	12	193 53	194 00	194 07	194 14	194 22	194 29	194 37	194 45	194 53	195 01
	16	198 32	198 41	198 51	199 00	199 10	199 19	199 30	199 41	199 51	200 03
	20	203 12	203 23	203 35	203 47	203 59	204 11	204 24	204 37	204 51	205 05
	24	207 52	208 06	208 20	208 34	208 49	209 03	209 19	209 35	209 51	210 08
	28	212 34	212 50	213 06	213 22	213 39	213 57	214 15	214 33	214 52	215 12
♏	2	217 16	217 34	217 53	218 11	218 31	218 51	219 11	219 32	219 53	220 19
	6	222 00	222 19	222 41	223 01	223 23	223 45	224 08	224 32	224 55	225 23
	10	226 45	227 07	227 30	227 53	228 17	228 41	229 07	229 32	229 59	230 26
	14	231 29	231 54	232 18	232 44	233 09	233 37	234 04	234 32	235 01	235 32
	18	236 17	236 43	237 09	237 37	238 05	238 34	239 03	239 33	240 05	240 38
	22	241 03	241 31	241 59	242 29	242 59	243 30	244 01	244 34	245 07	245 42
	26	245 49	246 18	246 49	247 20	247 52	248 24	248 58	249 33	250 08	250 45
♐	0	250 34	251 05	251 37	252 10	252 44	253 18	253 54	254 30	255 08	255 47
	4	255 20	255 53	256 26	257 00	257 36	258 11	258 49	259 26	260 06	260 47
	8	260 03	260 37	261 12	261 47	262 24	263 02	263 41	264 20	265 01	265 43
	12	264 44	265 20	265 55	266 32	267 10	267 49	968 29	269 19	269 52	270 36
	16	269 23	269 59	270 37	271 14	271 53	272 32	273 14	273 56	274 39	275 25
	20	273 59	274 35	275 13	275 51	276 31	277 11	277 53	278 36	279 21	280 09
	24	278 31	279 07	279 45	280 24	281 04	281 45	282 27	283 11	283 56	284 43
	28	282 58	283 35	284 12	284 51	285 32	286 13	286 56	287 40	288 25	289 13
♑	2	287 19	287 56	288 34	289 13	289 55	290 36	291 18	292 02	292 47	293 34
	6	291 35	292 12	292 50	293 29	294 09	294 50	295 32	296 16	297 01	297 48
	10	295 45	296 21	296 59	297 37	298 17	298 57	299 39	300 22	301 07	301 53
	14	299 48	300 24	301 01	301 39	302 18	302 57	303 38	304 21	305 04	305 49
	18	303 46	304 22	304 57	305 34	306 11	306 51	307 30	308 11	308 54	309 37
	22	307 36	308 10	308 45	309 20	309 57	310 35	311 13	311 54	312 34	313 17
	26	311 20	311 53	312 27	313 00	313 36	314 12	314 49	315 28	316 ·6	316 48
♒	0	314 58	315 29	316 01	316 34	317 08	317 42	318 18	318 54	319 32	320 21
	4	318 29	318 58	319 29	320 00	320 32	321 04	321 39	322 13	322 49	323 26
	8	321 54	322 21	322 50	323 19	323 50	324 20	324 52	325 25	325 58	326 31
	12	325 13	325 39	326 06	326 33	327 01	327 30	328 00	328 30	329 02	329 34
	16	328 27	328 51	329 16	329 41	330 07	330 34	331 02	331 29	331 58	332 28
	20	331 35	331 57	332 20	332 43	333 07	333 31	333 57	334 22	334 49	335 16
	24	334 40	334 59	335 20	335 41	336 03	336 25	336 48	337 11	337 35	338 00
	28	337 39	337 56	338 16	338 34	338 53	339 14	339 33	339 55	340 16	340 38
♓	2	340 35	340 50	341 08	341 23	341 41	341 58	342 15	342 35	342 53	343 12
	6	343 28	343 41	343 56	344 09	344 25	344 39	344 54	345 11	345 26	345 44
	10	346 18	346 29	346 41	346 53	347 05	347 17	347 30	347 43	347 57	348 12
	14	349 05	349 14	349 24	349 33	349 43	349 53	350 03	350 14	350 25	350 36
	18	351 50	351 57	352 04	352 12	352 19	352 26	352 34	352 42	352 50	352 59
	22	354 34	354 39	354 44	354 49	354 54	354 58	355 04	355 09	355 14	355 20
	26	357 18	357 20	357 23	357 25	357 28	357 30	357 52	357 35	357 38	357 40
	30	360 00	360 00	360 00	360 00	360 60	360 00	360 00	360 00	360 00	360 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

		41	42	43	44	45	46	47	48	49	50
S	D	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♈	0	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00
	4	002 16	002 13	002 11	002 08	002 04	002 00	001 55	001 53	001 50	001 46
	8	004 34	004 28	004 22	004 16	004 09	004 02	003 55	003 48	003 40	003 32
	12	006 53	006 44	006 34	0 6 25	006 15	006 05	005 55	005 44	005 32	005 20
	16	009 13	009 00	008 48	008 36	008 23	0 8 09	007 55	007 40	007 25	007 09
	20	011 35	011 20	011 04	010 49	010 32	010 15	009 58	009 39	009 20	009 00
	24	013 59	013 42	013 24	013 05	012 14	012 24	012 03	011 41	011 18	010 55
	28	016 28	016 07	015 46	015 24	015 01	014 37	014 12	013 46	013 20	012 52
♉	2	018 59	018 36	018 12	017 46	017 20	016 53	016 25	015 56	015 25	014 53
	6	021 34	021 08	020 41	020 12	019 43	019 13	018 41	018 09	017 34	016 58
	10	024 15	023 46	023 16	022 45	022 12	021 39	021 04	020 21	019 49	019 09
	14	027 01	026 29	025 56	025 22	024 47	024 10	023 31	022 51	022 10	021 26
	18	029 53	029 18	028 44	028 06	027 28	026 47	026 05	025 23	024 28	023 49
	22	032 52	032 15	031 37	030 57	030 15	029 33	028 48	028 02	027 13	026 21
	26	035 56	035 16	034 35	033 53	033 10	032 23	031 46	030 46	029 53	028 59
♊	0	039 09	038 27	037 44	036 59	036 13	035 24	034 34	033 41	032 45	031 47
	4	042 30	041 46	041 02	040 14	039 25	038 34	037 41	036 45	035 47	034 46
	8	046 00	045 13	044 27	043 38	042 47	041 52	040 58	040 01	038 49	037 55
	12	049 38	048 51	048 02	047 11	046 18	045 24	044 25	043 24	042 22	041 14
	16	053 25	052 36	051 46	050 53	049 59	049 03	048 03	047 01	045 56	044 47
	20	057 20	056 30	055 39	054 46	053 50	052 53	051 52	050 24	049 42	048 32
	24	061 24	060 34	059 43	058 48	057 52	056 53	055 52	054 48	053 40	052 29
	28	065 38	064 42	063 55	063 01	062 04	061 04	060 03	058 58	057 50	056 38
♋	2	069 59	069 02	068 17	067 21	066 26	065 27	064 25	063 20	062 11	061 00
	6	074 29	073 39	072 47	071 53	070 56	069 58	068 57	067 52	066 44	065 35
	10	079 06	078 16	077 25	076 32	075 36	074 39	073 38	072 34	071 28	070 18
	14	083 49	083 01	082 11	081 18	080 24	079 28	078 28	077 26	076 20	075 12
	18	088 39	087 52	087 04	086 12	085 20	084 25	083 26	082 26	081 24	080 16
	22	93 33	092 47	092 01	091 11	090 20	089 27	088 31	087 34	086 32	085 21
	26	098 31	097 47	097 02	096 15	095 26	094 35	093 42	092 46	091 48	090 47
♌	0	103 33	102 51	102 08	101 23	100 37	099 48	098 58	098 05	097 09	096 11
	4	108 37	107 57	107 16	106 34	105 50	105 04	104 17	103 27	102 34	101 40
	8	113 42	113 05	112 27	111 47	111 06	110 23	109 38	108 52	108 03	107 12
	12	118 49	118 15	117 39	117 02	116 23	115 44	115 02	114 19	113 34	112 46
	16	123 57	123 25	122 53	122 19	121 42	121 06	120 28	119 48	119 07	118 23
	20	129 05	128 36	128 06	127 35	127 02	126 29	125 54	125 17	124 39	123 59
	24	134 14	133 48	133 21	132 52	132 23	131 52	131 20	130 49	130 13	129 37
	28	139 22	138 58	138 34	138 08	147 43	137 15	136 47	136 18	135 48	135 15
♍	2	144 29	144 08	143 47	143 24	143 02	142 38	142 13	141 47	141 21	140 53
	6	149 35	149 18	148 59	148 40	148 20	148 00	147 39	147 17	146 54	146 30
	10	154 41	154 26	154 10	153 55	153 38	153 21	153 04	152 45	152 26	152 06
	14	159 46	159 34	159 22	159 09	158 56	158 42	158 28	158 13	157 58	157 42
	18	164 50	164 41	164 31	164 22	164 12	164 02	163 52	163 41	163 29	163 17
	22	169 53	169 48	169 41	169 35	169 28	169 22	169 15	169 08	169 00	168 52
	26	174 57	174 54	174 51	174 48	174 44	174 41	174 38	174 34	174 31	174 27
	30	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	41	42	43	44	45	46	47	48	49	50
		D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00
	4	185 03	185 06	185 09	185 12	185 16	185 19	185 22	185 26	185 29	185 33
	8	190 07	190 12	190 19	190 25	190 32	190 38	190 45	190 52	191 00	191 08
	12	195 10	195 19	195 29	195 38	195 48	195 58	196 08	196 19	196 31	196 31
	16	209 14	200 26	200 38	200 51	201 04	201 18	201 32	201 47	202 02	202 18
	20	205 19	205 34	205 50	206 05	206 22	206 39	206 56	207 15	207 34	207 54
	24	210 25	210 42	211 01	211 20	211 40	212 00	212 21	212 43	213 06	213 30
	28	215 31	215 52	216 13	216 36	216 58	217 22	217 47	218 13	218 39	219 07
♏	2	220 38	221 02	221 26	221 52	222 17	222 45	223 13	223 42	224 12	224 44
	6	225 46	226 12	226 39	227 08	227 37	228 08	228 40	229 11	229 47	230 23
	10	230 55	231 24	231 54	232 25	232 58	233 31	234 06	234 43	235 21	236 01
	14	236 03	236 35	237 07	237 41	238 18	238 54	239 32	240 12	240 53	241 37
	18	241 11	241 45	242 21	242 58	243 37	244 16	244 58	245 41	246 26	247 14
	22	246 18	246 55	247 33	248 13	248 54	249 37	250 22	251 08	251 57	252 48
	26	251 23	252 03	252 44	253 26	254 10	254 56	255 43	256 33	257 26	258 20
♐	0	256 27	257 09	257 52	258 37	259 23	160 12	261 02	261 55	262 51	263 49
	4	261 29	262 13	262 58	263 45	264 34	265 25	266 18	267 14	268 12	269 13
	8	266 27	267 13	267 59	268 49	269 40	270 33	271 29	272 26	273 28	274 33
	12	271 21	272 08	272 56	273 48	274 40	275 35	276 34	277 34	278 36	279 44
	16	276 11	276 59	277 49	278 42	279 36	280 32	281 32	282 34	283 40	284 48
	20	280 54	281 44	282 35	283 28	284 24	285 21	286 22	287 26	288 32	289 42
	24	285 31	286 21	287 13	288 07	289 04	290 02	291 03	292 08	293 16	294 27
	28	290 01	290 51	291 43	292 39	293 34	294 33	295 35	296 40	297 49	299 00
♑	2	294 22	295 12	296 05	296 59	297 56	298 56	299 57	301 02	302 10	303 22
	6	298 36	299 26	300 17	301 12	302 08	303 07	304 08	305 12	306 20	307 31
	10	302 40	303 30	304 21	305 14	306 10	307 07	308 08	309 12	310 18	311 28
	14	306 35	307 24	308 14	309 07	310 01	310 57	311 57	312 59	314 04	315 13
	18	310 22	311 09	311 58	312 49	313 42	314 36	315 35	316 36	317 38	318 46
	22	314 00	314 47	315 33	316 22	317 13	318 07	319 02	319 59	321 01	322 05
	26	317 30	318 14	318 58	319 46	320 35	321 26	322 19	323 15	324 13	325 14
♒	0	320 51	321 33	322 16	323 01	323 47	324 36	325 26	326 19	327 15	328 13
	4	324 04	324 44	325 25	326 07	326 50	327 37	328 24	329 14	330 07	331 01
	8	327 08	327 55	328 23	329 03	329 45	330 27	331 12	331 58	332 47	333 39
	12	330 07	330 42	331 16	331 54	332 32	333 13	333 55	334 37	335 22	336 11
	16	332 59	333 31	334 04	334 38	335 13	335 50	336 29	337 09	337 50	338 34
	20	335 45	336 14	336 44	337 15	337 48	338 21	338 56	339 33	340 11	340 51
	24	338 26	338 51	339 19	339 48	340 17	340 47	341 19	341 51	342 26	343 02
	28	341 01	341 23	341 48	342 14	342 40	343 07	343 35	344 04	344 35	345 07
♓	2	343 32	343 53	344 14	344 36	344 59	345 23	345 48	346 14	346 40	347 08
	6	346 01	346 18	346 36	346 55	347 16	347 36	347 57	348 19	348 42	349 05
	10	348 25	348 40	348 56	349 11	349 28	349 45	350 02	350 21	350 40	351 00
	14	350 47	351 00	351 12	351 24	351 37	351 51	352 05	352 20	352 35	352 51
	18	353 07	353 16	353 26	353 35	353 45	353 55	354 05	354 16	354 28	354 40
	22	355 26	355 32	355 38	355 44	355 51	355 58	356 05	356 12	356 20	356 28
	26	357 44	357 47	357 49	357 42	357 56	358 00	358 03	358 07	358 10	358 14
	30	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	51 D ′	52 D ′	53 D ′	54 D ′	55 D ′	56 D ′	57 D ′	58 D ′	59 D ′	60 D ′
♈	0	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00	000 00
	4	001 41	001 37	001 32	001 28	001 23	001 18	001 12	001 07	001 00	000 54
	8	003 24	003 15	003 06	002 57	002 47	002 37	002 26	002 14	002 01	001 49
	12	005 08	004 55	004 41	004 27	004 12	003 57	003 40	003 22	003 04	002 45
	16	006 52	006 35	006 17	005 58	005 39	005 17	004 56	004 32	004 07	003 41
	20	008 40	008 18	007 55	007 32	007 07	006 41	006 13	005 43	005 12	004 39
	24	010 30	010 04	009 36	009 08	008 38	008 06	007 33	006 57	006 20	005 39
	28	012 23	011 53	011 20	010 47	010 13	009 35	008 56	008 14	007 30	006 43
♉	2	014 20	013 45	013 08	012 20	011 50	011 07	010 22	009 38	008 44	007 50
	6	016 21	015 42	015 01	014 18	013 32	012 44	011 52	010 59	010 01	008 59
	10	018 28	017 45	016 59	016 11	015 20	014 26	013 29	012 28	011 24	010 15
	14	020 40	019 52	019 02	018 08	017 13	016 13	015 11	014 03	012 51	011 35
	18	023 01	022 08	021 13	020 15	019 14	018 09	017 00	015 45	014 27	013 01
	22	025 28	024 31	023 31	022 28	021 22	020 12	018 56	017 35	016 09	014 36
	26	028 01	027 02	025 58	024 50	023 39	022 22	021 01	019 33	018 00	016 19
♊	0	030 46	029 42	028 34	027 22	026 06	024 44	023 17	021 43	020 02	018 12
	4	033 42	032 34	031 22	030 06	028 44	027 19	025 45	024 05	022 16	020 18
	8	036 48	035 36	034 22	033 01	031 35	030 05	028 27	026 40	024 46	022 40
	12	040 05	038 51	037 32	036 08	034 41	033 03	031 21	029 30	027 28	025 16
	16	043 35	042 19	040 57	039 31	037 59	036 20	034 33	032 36	030 30	028 10
	20	047 18	045 59	044 36	043 07	041 33	039 51	038 00	036 01	033 50	031 25
	24	051 13	049 53	048 29	046 58	045 23	043 38	041 46	039 43	037 30	035 01
	28	055 22	054 02	052 35	051 05	049 28	047 44	045 51	043 45	041 31	039 00
♋	2	059 44	058 24	056 59	055 28	053 49	052 05	050 12	048 07	045 52	043 22
	6	064 18	062 58	061 33	060 03	058 27	056 43	054 50	052 48	050 34	048 06
	10	069 04	067 45	066 22	064 53	063 19	061 37	059 46	057 47	055 36	053 11
	14	073 59	072 44	071 22	069 56	068 24	066 44	064 57	063 01	060 54	058 35
	18	079 08	077 52	076 34	075 10	073 41	072 05	070 23	068 31	066 30	064 17
	22	084 21	083 10	081 55	080 35	079 08	077 37	075 59	074 14	072 19	070 12
	26	089 42	088 34	087 22	086 06	084 45	083 19	081 46	080 06	78 18	076 20
♌	0	095 10	094 06	092 58	091 46	090 30	089 08	087 41	086 07	084 26	082 36
	4	100 42	099 42	098 38	097 31	096 20	095 04	093 42	092 14	090 41	088 59
	8	106 18	105 22	104 22	103 19	102 14	101 03	099 47	098 26	97 00	095 37
	12	111 57	111 04	110 09	109 11	1 8 10	107 05	105 56	104 42	103 23	101 58
	16	117 37	116 49	115 59	115 05	114 10	113 10	112 07	111 00	1 9 48	108 31
	20	123 18	122 35	121 49	121 01	120 10	119 16	118 19	117 18	116 14	115 05
	24	129 01	128 22	127 41	126 57	126 12	125 24	124 31	123 38	222 41	121 39
	28	134 43	134 08	133 31	132 53	132 13	131 30	130 45	129 57	129 6	128 12
♍	2	140 24	139 54	139 22	138 48	138 13	137 36	136 57	136 15	135 31	134 44
	6	146 06	145 40	145 12	144 43	144 13	143 42	143 08	142 33	141 55	141 15
	10	151 46	151 24	151 01	150 38	150 13	149 47	149 19	148 49	148 18	147 45
	14	157 26	157 08	156 50	156 31	156 11	155 51	155 29	155 05	154 40	154 14
	18	163 05	162 52	162 38	162 24	162 10	161 54	161 37	161 20	161 01	160 42
	22	168 44	168 35	168 26	168 16	168 07	107 57	167 45	167 34	167 21	167 09
	26	174 22	174 18	174 13	174 08	174 04	173 59	173 53	173 48	173 41	173 35
	30	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00

A Table of the Oblique Aſcenſions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	51 D ′	52 D ′	53 D ′	54 D ′	55 D ′	56 D ′	57 D ′	58 D ′	59 D ′	60 D ′
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00	180 00
	4	185 38	185 42	185 47	185 52	185 56	186 01	186 07	186 12	186 19	186 25
	8	191 16	191 25	191 34	191 44	191 53	192 03	192 15	192 26	192 39	192 51
	12	196 55	197 08	197 22	197 36	197 50	198 06	198 23	198 40	198 59	199 18
	16	202 34	202 52	203 10	203 29	203 49	204 09	204 31	204 55	205 20	205 46
	20	208 14	208 36	208 59	209 22	209 47	210 13	210 41	211 11	211 42	212 15
	24	213 54	214 20	214 48	215 17	215 47	216 18	216 52	217 27	218 05	218 45
	28	219 36	220 16	220 38	221 12	221 47	222 24	223 03	223 45	224 29	225 16
♏	2	225 17	225 52	226 29	227 07	227 47	228 30	229 15	230 03	230 54	231 48
	6	230 59	231 38	232 19	233 33	233 48	234 36	235 29	236 22	237 19	238 21
	10	236 42	237 25	238 11	238 59	239 50	240 44	241 41	242 42	243 46	244 55
	14	242 23	243 11	244 01	244 55	245 50	246 50	247 53	249 00	250 12	251 29
	18	248 03	248 56	249 51	250 49	251 50	252 55	254 04	255 18	256 37	258 02
	22	253 42	254 38	255 38	256 41	257 47	258 57	260 13	261 34	263 00	264 33
	26	259 18	260 18	261 22	260 29	263 40	264 56	266 18	267 46	269 19	271 01
♐	0	264 50	265 54	267 02	268 14	269 30	270 52	272 19	273 53	275 34	277 24
	4	270 18	271 26	272 38	273 54	275 15	276 41	278 14	279 54	281 42	283 4[illegible]
	8	275 39	276 50	278 05	279 25	280 52	282 23	284 01	285 46	287 41	289 43
	12	280 52	282 08	283 26	284 50	286 19	287 55	289 37	291 29	293 30	295 43
	16	286 01	287 16	288 38	290 04	291 36	293 16	295 03	296 59	299 06	301 25
	20	290 56	292 15	293 38	295 07	296 41	298 22	300 14	302 13	304 24	306 49
	24	295 42	297 02	298 27	299 57	301 33	303 17	305 10	307 12	309 26	311 54
	28	300 16	301 36	303 01	304 32	306 11	307 55	309 48	311 53	314 18	316 38
♑	2	304 38	305 58	307 25	308 55	310 32	312 16	314 09	316 15	318 29	321 0[illegible]
	6	308 47	310 07	311 31	313 02	314 37	316 21	318 14	320 17	322 30	324 59
	10	312 42	314 01	215 24	316 53	318 27	320 09	322 00	323 59	326 10	328 35
	14	316 25	317 41	319 03	320 29	322 01	323 40	325 27	327 24	329 30	331 5[illegible]
	18	319 55	321 09	322 28	323 52	325 19	326 57	328 39	330 30	332 32	334 44
	22	323 12	324 24	325 38	326 59	328 25	329 55	331 33	333 20	335 14	337 2[illegible]
	26	326 18	327 26	328 38	329 54	331 16	332 42	334 15	335 55	337 44	339 42
♒	0	329 14	330 18	331 26	332 38	333 54	335 16	336 43	338 17	339 58	341 48
	4	331 59	332 58	334 02	335 10	336 21	337 51	338 59	340 27	342 00	343 41
	8	334 32	335 29	336 29	337 32	338 38	339 48	341 04	342 25	343 51	345 24
	12	336 59	337 52	338 47	339 45	340 46	341 38	343 00	344 15	345 33	346 59
	16	339 20	340 18	340 58	341 52	342 47	343 47	344 49	345 57	347 19	348 25
	20	341 32	342 15	343 01	343 49	344 40	345 34	346 31	347 32	348 36	349 45
	24	343 39	344 18	344 59	345 42	346 28	347 16	348 08	349 01	348 59	351 01
	28	345 40	346 15	346 52	347 30	348 10	348 53	349 38	350 26	351 16	352 10
♓	2	347 37	348 07	348 40	349 13	349 47	350 25	351 04	351 46	352 30	353 17
	6	349 30	349 56	350 24	350 52	351 22	351 54	352 27	353 03	353 40	354 21
	10	351 20	351 42	352 05	352 28	352 53	353 19	353 47	354 17	354 48	355 21
	14	353 08	353 25	353 43	354 02	354 21	354 43	355 04	355 28	355 53	356 19
	18	354 52	355 05	355 19	355 33	355 48	356 03	356 20	356 38	356 56	357 15
	22	356 36	356 45	356 54	357 03	357 13	357 23	357 34	357 46	357 58	358 11
	26	358 19	358 23	358 28	358 32	358 37	358 42	358 48	358 53	359 00	359 06
	30	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00	360 00

A Table of the Oblique Ascensions of the *Ecliptique*, from 0. to 67 degrees of Latitude.

Elevation of the Pole.

		61	62	63	64	65	66	67
S	D	D ′	D ′	D ′	D ′	D ′	D ′	D ′
♈	0	000 00	000 00	000 00	000 00	000 00	000 00	000 00
	4	000 46	000 39	000 32	000 23	000 15	000 04	359 55
	8	001 35	001 21	001 05	000 47	000 30	000 10	359 49
	12	002 24	002 02	001 38	001 12	000 45	000 15	359 45
	16	003 12	002 43	002 10	001 37	001 01	000 20	359 40
	20	004 04	003 26	002 46	002 03	001 17	000 27	359 34
	24	004 57	004 11	003 22	002 31	001 34	000 32	359 28
	28	005 53	004 59	004 02	003 00	001 52	000 39	359 21
♉	2	006 51	005 48	004 42	003 30	002 11	000 46	359 14
	6	007 54	006 42	005 25	004 02	002 31	000 53	359 04
	10	009 00	007 40	006 12	004 38	002 54	001 01	358 54
	14	010 10	008 41	007 04	005 16	003 19	001 09	358 43
	18	011 29	009 49	008 01	006 01	003 47	001 20	358 30
	22	012 54	011 04	009 04	006 49	004 19	001 31	358 16
	26	014 29	012 27	010 14	007 45	004 57	001 46	358 00
♊	0	016 13	014 00	011 33	008 47	005 41	002 02	357 40
	4	018 08	015 46	013 04	010 03	006 34	002 20	357 15
	8	020 20	017 45	014 50	011 31	007 37	002 42	356 18
	12	022 48	020 02	016 54	013 15	008 54	003 08	353 18
	16	025 34	022 39	019 18	015 22	010 34	003 08	348 57
	20	028 44	025 40	022 10	018 00	012 44	004 12	000 00
	24	032 13	029 02	025 26	021 00	015 18	004 49	000 00
	28	036 09	032 56	029 13	024 42	018 49	006 49	000 00
♋	2	040 33	037 21	033 37	029 04	023 11	011 10	000 00
	6	045 18	042 10	038 31	034 06	028 26	017 46	000 00
	10	050 28	047 28	043 57	039 43	034 27	026 01	000 0
	14	055 59	053 05	049 45	045 49	040 59	034 12	019 13
	18	061 50	059 05	055 56	052 17	047 58	042 19	032 20
	22	067 57	065 21	062 24	059 04	055 11	050 23	043 52
	26	074 10	071 45	069 05	066 02	062 32	058 25	053 17
♌	0	080 37	078 22	075 56	073 12	070 01	066 25	061 02
	4	087 09	085 07	082 54	080 25	077 37	074 25	070 41
	8	093 46	091 55	089 54	087 41	085 13	082 21	079 08
	12	100 26	098 47	096 58	094 57	092 46	090 15	087 30
	16	107 08	105 38	104 01	102 13	100 17	098 05	095 41
	20	113 50	112 30	111 03	109 29	107 45	105 51	103 46
	24	120 33	119 22	118 06	116 42	115 11	113 33	111 44
	28	127 14	126 11	125 06	123 52	122 34	121 08	119 39
♍	2	133 53	132 59	132 02	131 00	129 54	128 40	127 24
	6	140 33	139 47	138 58	138 07	137 10	136 08	135 01
	10	147 10	146 33	145 52	145 10	144 24	143 03	142 3′
	14	153 46	153 16	152 44	152 10	151 34	150 54	150 12
	18	160 21	160 00	159 36	159 10	158 42	158 13	157 41
	22	166 55	166 40	166 24	166 07	165 50	165 29	165 08
	26	173 26	173 19	173 12	173 03	172 56	172 44	172 25
	30	180 00	180 00	180 00	180 00	180 00	180 00	180 00

A Table of the Oblique Ascensions of the *Ecliptique* from 0. to 67 degrees of Latitude.

Elevation of the Pole.

S	D	61	62	63	64	65	66	67
		D ′	D ′	D ′	D ′	D ′	D ′	D ′
♎	0	180 00	180 00	180 00	180 00	180 00	180 00	189 00
	4	186 34	186 41	186 48	186 57	187 04	187 16	187 35
	8	193 05	193 20	193 36	193 53	194 10	194 31	194 51
	12	199 39	200 00	200 24	200 50	201 18	201 47	202 19
	16	206 14	206 44	207 16	207 50	208 26	209 06	209 48
	20	212 50	213 27	214 08	214 50	215 36	216 27	217 30
	24	219 27	220 13	221 02	221 53	222 50	223 52	224 49
	28	226 07	227 01	227 58	229 00	230 06	231 20	232 36
♏	2	232 46	233 49	234 54	236 08	237 26	238 52	240 21
	6	239 27	240 38	241 54	243 18	244 49	246 27	248 16
	10	246 10	247 30	248 57	250 31	252 15	254 09	256 14
	14	252 52	254 22	255 59	257 47	259 43	261 55	264 19
	18	259 34	261 13	263 02	265 03	267 14	269 45	272 30
	22	266 14	268 05	270 06	272 19	274 47	277 39	280 52
	26	272 51	274 53	277 06	279 35	282 23	285 35	289 19
♐	0	279 23	281 38	284 04	286 48	289 59	293 35	297 58
	4	285 50	288 15	290 55	293 58	297 28	301 35	306 43
	8	292 06	294 05	297 36	300 56	304 49	309 37	316 08
	12	298 10	300 55	304 04	307 43	312 02	317 41	327 40
	16	304 01	306 38	310 15	314 11	319 01	325 48	340 37
	20	309 32	312 15	316 03	320 17	325 33	333 59	
	24	314 42	317 39	321 29	325 54	331 34	342 14	
	28	319 27	322 55	326 23	330 56	336 49	348 50	
♑	2	323 51	327 55	330 47	335 18	341 11	353 11	
	6	327 47	330 32	334 34	339 00	344 42	355 11	
	10	331 16	334 50	337 50	342 00	347 16	355 48	
	14	334 26	337 39	340 42	344 38	349 26	356 22	
	18	337 12	339 04	343 06	346 45	351 06	356 52	
	22	339 40	342 58	345 10	348 29	352 23	357 18	
	26	341 52	344 20	346 56	349 57	353 26	357 40	
♒	0	343 47	346 21	348 27	351 13	354 19	357 58	
	4	345 31	347 28	349 46	352 15	355 03	358 14	
	8	347 06	348 15	350 56	353 11	355 41	358 29	
	12	348 31	350 54	351 59	353 59	356 13	358 40	
	16	349 50	351 10	352 56	354 44	356 41	358 51	
	20	350 00	352 18	353 48	355 22	357 06	358 59	
	24	352 06	353 16	354 35	355 58	357 29	359 07	
	28	353 09	354 11	355 18	356 30	357 49	359 14	
♓	2	354 07	355 19	355 58	357 00	358 08	359 21	
	6	355 03	355 39	356 38	357 29	358 26	359 28	
	10	355 56	356 28	357 14	357 57	358 43	359 33	
	14	356 48	357 12	357 50	358 23	358 59	359 40	
	18	357 36	357 58	358 22	358 48	359 15	359 45	
	22	358 25	358 39	358 55	359 13	359 30	359 50	
	26	359 14	359 21	359 28	359 37	359 45	359 56	
	30	360 00	360 00	360 00	360 00	360 00	360 00	

The Sexagenarie Table, serving for *Multiplication*, *Division*, and for finding the Part Proportionall.

	1	2	3	4	5	6	7	8	9	10
1	0 01	0 02	0 03	0 04	0 05	0 06	0 07	0 08	0 09	0 10
2	0 02	0 04	0 06	0 08	0 10	0 12	0 14	0 16	0 18	0 20
3	0 03	0 06	0 09	0 12	0 15	0 18	0 21	0 24	0 27	0 30
4	0 04	0 08	0 12	0 16	0 20	0 24	0 28	0 32	0 36	0 40
5	0 05	0 10	0 15	0 20	0 25	0 30	0 35	0 40	0 45	0 50
6	0 06	0 12	0 18	0 24	0 30	0 36	0 42	0 48	0 54	1 00
7	0 07	0 14	0 21	0 28	0 35	0 42	0 49	0 56	1 03	1 10
8	0 08	0 16	0 24	0 32	0 40	0 48	0 56	1 04	1 12	1 20
9	0 09	0 18	0 27	0 36	0 45	0 54	1 03	1 12	1 21	1 30
10	0 10	0 20	0 30	0 40	0 50	1 00	1 10	1 20	1 30	1 40
11	0 11	0 22	0 33	0 44	0 55	1 06	1 17	1 28	1 39	1 50
12	0 12	0 24	0 36	0 48	1 00	1 12	1 24	1 36	1 48	2 00
13	0 13	0 26	0 39	0 52	1 05	1 18	1 31	1 44	1 57	2 10
14	0 14	0 28	0 42	0 56	1 10	1 24	1 38	1 52	2 06	2 20
15	0 15	0 30	0 45	1 00	1 15	1 30	1 45	2 00	2 15	2 30
16	0 16	0 32	0 48	1 04	1 20	1 36	1 52	2 08	2 24	2 40
17	0 17	0 34	0 51	1 08	1 25	1 42	1 59	2 16	2 33	2 50
18	0 18	0 36	0 54	1 12	1 30	1 48	2 06	2 24	2 42	3 00
19	0 19	0 38	0 57	1 16	1 35	1 54	2 13	2 32	2 51	3 10
20	0 20	0 40	1 00	1 20	1 40	2 00	2 20	2 40	3 00	3 20
21	0 21	0 42	1 03	1 24	1 45	2 06	2 27	2 48	3 09	3 30
22	0 22	0 44	1 06	1 28	1 50	2 12	2 34	2 56	3 18	3 40
23	0 23	0 46	1 09	1 32	1 55	2 18	2 41	3 04	3 27	3 50
24	0 24	0 48	1 12	1 36	2 00	2 24	2 48	3 12	3 36	4 00
25	0 25	0 50	1 15	1 40	2 05	2 30	2 55	3 20	3 45	4 10
26	0 26	0 52	1 18	1 44	2 10	2 36	3 02	3 28	3 54	4 20
27	0 27	0 54	1 21	1 48	2 15	2 42	3 09	3 36	4 03	4 30
28	0 28	0 56	1 24	1 52	2 20	2 48	3 16	3 44	4 12	4 40
29	0 29	0 58	1 27	1 56	2 25	2 54	3 23	3 52	4 21	4 50
30	0 30	1 00	1 30	2 00	2 30	3 00	3 30	4 00	4 30	5 00
31	0 31	1 02	1 33	2 04	2 35	3 06	3 37	4 08	4 39	5 10
32	0 32	1 04	1 36	2 08	2 40	3 12	3 44	4 16	4 48	5 20
33	0 33	1 06	1 39	2 12	2 45	3 18	3 51	4 24	4 57	5 30
34	0 34	1 08	1 42	2 16	2 50	3 24	3 58	4 32	5 06	5 40
35	0 35	1 10	1 45	2 20	2 55	3 30	4 05	4 40	5 15	5 50
36	0 36	1 12	1 48	2 24	3 00	3 36	4 12	4 48	5 24	6 00
37	0 37	1 14	1 51	2 28	3 05	3 42	4 19	4 56	5 33	6 10
38	0 38	1 16	1 54	2 32	3 10	3 48	4 26	5 04	5 42	6 20
39	0 39	1 18	1 57	2 36	3 15	3 54	4 33	5 12	5 51	6 30
40	0 40	1 20	2 00	2 40	3 20	4 00	4 40	5 20	6 00	6 40
41	0 41	1 22	2 03	2 44	3 25	4 06	4 47	5 28	6 09	6 50
42	0 42	1 24	2 06	2 48	3 30	4 12	4 54	5 36	6 18	7 00
43	0 43	1 26	2 09	2 52	3 35	4 18	5 01	5 44	6 27	7 10
44	0 44	1 28	2 12	2 56	3 40	4 24	5 08	5 52	6 36	7 20
45	0 45	1 30	2 15	3 00	3 45	4 30	5 15	6 00	6 45	7 30
46	0 46	1 32	2 18	3 04	3 50	4 36	5 22	6 08	6 54	7 40
47	0 47	1 34	2 21	3 08	3 55	4 42	5 29	6 16	7 03	7 50
48	0 48	1 36	2 24	3 12	4 00	4 48	5 36	6 24	7 12	8 00
49	0 49	1 38	2 27	3 16	4 05	4 54	5 43	6 32	7 21	8 10
50	0 50	1 40	2 30	3 20	4 10	5 00	5 50	6 40	7 30	8 20
51	0 51	1 42	2 33	3 24	4 15	5 06	5 57	6 48	7 39	8 30
52	0 52	1 44	2 36	3 28	4 20	5 12	6 04	6 56	7 48	8 40
53	0 53	1 46	2 39	3 32	4 25	5 18	6 11	7 04	7 57	8 50
54	0 54	1 48	2 42	3 36	4 30	5 24	6 18	7 12	8 06	9 00
55	0 55	1 50	2 45	3 40	4 35	5 30	6 25	7 20	8 15	9 10
56	0 56	1 52	2 48	3 44	4 40	5 36	6 32	7 28	8 24	9 20
57	0 57	1 54	2 51	3 48	4 45	5 42	6 39	7 36	8 33	9 30
58	0 58	1 56	2 54	3 52	4 50	5 48	6 46	7 44	8 42	9 40
59	0 59	1 58	2 57	3 56	4 55	5 54	6 53	7 52	8 51	9 50
60	1 00	2 00	3 00	4 00	5 00	6 00	7 00	8 00	9 00	10 00

The Sexagenarie Table, ſerving for *Multiplication*, *Diviſion*, and for finding the Part Proportionall.

	11	12	13	14	15	16	17	18	19	20
1	00 11	00 12	00 13	00 14	0 015	00 16	00 17	00 18	00 19	00 20
2	00 22	00 24	00 26	00 28	00 30	00 32	00 34	00 36	00 38	00 40
3	00 33	00 36	00 39	00 42	00 45	00 48	00 51	00 54	00 57	01 00
4	00 44	00 48	00 52	00 56	01 00	01 04	01 08	01 12	01 16	01 20
5	00 55	01 00	01 05	01 10	01 15	01 20	01 25	01 30	01 35	01 40
6	01 06	01 12	01 18	01 24	01 30	01 36	01 42	01 48	01 54	02 00
7	01 17	01 24	01 31	01 38	01 45	01 52	02 59	02 06	02 13	02 20
8	01 28	01 36	01 44	01 52	02 00	02 08	02 16	02 24	02 32	02 40
9	01 39	01 48	01 57	02 06	02 15	02 24	02 33	02 42	02 51	03 00
10	01 50	02 00	02 10	02 20	02 30	02 40	02 50	03 00	03 10	03 20
11	02 01	02 12	02 23	02 34	02 45	02 56	03 07	03 18	03 29	03 40
12	02 12	02 24	02 36	02 48	03 00	03 12	03 24	03 36	03 48	04 00
13	02 23	02 36	02 49	03 02	03 15	03 28	03 41	03 54	04 07	04 20
14	02 34	02 48	03 02	03 16	03 30	03 44	03 58	04 12	04 26	04 40
15	02 45	03 00	03 15	03 30	03 45	04 00	04 15	04 30	04 45	05 00
16	02 56	03 12	03 28	03 44	04 00	04 16	04 32	04 48	05 04	05 20
17	03 07	03 24	03 41	03 58	04 15	04 32	04 49	05 06	05 23	05 40
18	03 18	03 36	03 54	04 12	04 30	04 48	05 06	05 24	05 42	06 00
19	03 29	03 48	04 07	04 26	04 45	05 04	05 23	05 42	06 01	06 20
20	03 40	04 00	04 20	04 40	05 00	05 20	05 40	06 00	06 20	06 40
21	03 51	04 12	04 33	04 54	05 15	05 36	05 57	06 18	06 39	07 0
22	04 02	04 24	04 46	05 08	05 30	05 52	06 16	06 36	06 58	07 20
23	04 13	04 36	04 59	05 22	05 45	06 08	06 31	6 54	07 17	07 4
24	04 24	04 48	05 12	05 36	06 00	06 24	06 48	07 12	07 36	08 00
25	04 35	05 00	05 25	05 50	06 15	06 40	07 05	07 30	07 55	08 20
26	04 46	05 12	05 38	06 04	06 30	06 56	07 22	07 48	08 14	08 40
27	04 57	05 24	05 51	06 18	06 45	07 12	07 39	08 06	08 33	09 00
28	05 08	05 36	06 04	06 32	07 00	07 28	07 56	08 24	08 52	09 20
29	05 19	05 48	06 17	06 46	07 15	07 44	08 13	08 42	09 11	09 40
30	05 30	06 00	06 30	07 00	07 30	08 00	08 30	09 00	09 30	10 00
31	05 41	06 12	06 43	07 14	07 45	08 16	08 47	09 18	09 49	10 20
32	05 52	06 24	06 56	07 28	08 00	08 32	09 04	09 36	10 08	10 4
33	06 03	06 36	07 09	07 42	08 15	08 48	09 21	09 54	10 27	11 00
34	06 14	06 48	07 22	07 56	08 30	09 04	09 38	10 12	10 46	11 20
35	06 25	07 00	07 35	08 10	08 45	09 20	09 55	10 30	11 05	11 4
36	06 36	07 12	07 48	08 24	09 00	09 36	10 12	10 48	11 24	12 00
37	06 47	07 24	08 01	08 38	09 15	09 52	10 29	11 06	11 43	12 2
38	06 58	07 36	08 14	08 52	09 30	10 08	10 46	11 24	12 02	12 40
39	07 09	07 48	08 27	09 06	09 45	10 24	11 03	11 42	12 21	13 00
40	07 20	08 00	08 40	09 20	10 00	10 40	11 20	12 00	12 40	13 20
41	07 31	08 12	08 53	09 34	10 15	10 56	11 37	12 18	12 59	13 40
42	07 42	08 24	09 06	09 48	10 30	11 12	11 54	12 36	13 18	14 00
43	07 53	08 36	09 19	10 02	10 45	11 28	12 11	12 54	13 37	14 2
44	08 04	08 48	09 32	10 16	11 00	11 44	12 28	13 12	13 56	14 4
45	08 15	09 00	09 45	10 30	11 15	12 00	12 45	13 30	14 15	15 00
46	08 26	09 12	09 58	10 44	11 30	12 16	13 02	13 48	14 34	15 20
47	08 37	09 24	10 11	10 58	11 45	12 32	13 19	14 06	14 53	15 4
48	08 48	09 36	10 24	11 12	12 00	12 48	13 36	14 24	15 12	16 00
49	08 59	09 48	10 37	11 26	12 15	13 04	13 53	14 42	15 31	16 20
50	09 10	10 00	10 50	11 40	12 30	13 20	14 10	15 00	15 50	16 4
51	09 21	10 12	11 03	11 54	12 45	13 36	14 27	15 18	16 09	17 00
52	09 32	10 24	11 16	12 08	13 00	13 52	14 44	15 36	16 28	17 20
53	09 43	10 36	11 29	12 22	13 15	14 08	15 01	15 54	16 47	17 40
54	09 54	10 48	11 42	12 36	13 30	14 24	15 18	16 12	17 06	18 0
55	10 05	11 00	11 55	12 50	13 45	14 40	15 35	16 30	17 25	18 20
56	10 16	11 12	12 08	13 04	14 00	14 56	15 52	16 48	17 44	18 4
57	10 27	11 24	12 21	13 18	14 15	15 12	16 09	17 06	18 03	19 00
58	10 38	11 36	12 34	13 32	14 30	15 28	16 26	17 24	18 22	19 20
59	10 49	11 48	12 47	13 46	14 45	15 44	16 43	17 42	18 41	19 40
60	11 00	12 00	13 00	14 00	15 00	16 00	17 00	18 00	19 00	20 00

The Sexagenarie Table, serving for *Multiplication*, *Division*, and for finding the Part Proportionall.

	21	22	23	24	25	26	27	28	29	30
1	00 21	00 22	00 23	00 24	00 25	00 26	00 27	00 28	00 29	00 30
2	00 42	00 44	00 46	00 48	00 50	00 52	00 54	00 56	00 58	01 00
3	01 03	01 06	01 09	01 12	01 15	01 18	01 21	01 24	01 27	01 30
4	01 24	01 28	01 32	01 36	01 40	01 44	01 48	01 52	01 56	02 00
5	01 45	01 50	01 55	02 00	02 05	02 10	02 15	02 20	02 25	02 30
6	02 06	02 12	02 18	02 24	02 30	02 36	02 42	02 48	02 54	03 00
7	02 27	02 34	02 41	02 48	02 55	03 02	02 09	03 16	03 23	03 30
8	02 48	02 56	03 04	03 42	03 20	03 28	03 36	03 44	03 52	04 00
9	03 09	03 18	03 27	03 36	03 45	03 54	04 03	04 12	04 21	04 30
10	03 30	03 40	03 50	04 00	04 10	04 20	04 30	04 40	04 50	05 00
11	03 51	04 02	04 13	04 24	04 35	04 46	04 57	05 08	05 19	05 30
12	04 12	04 24	04 36	04 48	05 00	05 12	05 24	05 36	05 48	06 00
13	04 33	04 46	04 59	05 12	05 25	05 38	05 51	06 04	06 17	06 30
14	04 54	05 08	05 22	05 36	05 50	06 4	06 18	06 32	06 46	07 00
15	05 15	05 30	05 45	06 00	06 15	06 30	06 45	07 00	07 15	07 30
16	05 36	05 52	06 08	06 24	06 40	06 56	07 12	07 28	07 44	08 00
17	05 57	06 14	06 31	06 48	07 05	07 22	07 39	07 56	08 13	08 30
18	06 18	06 36	06 54	07 12	07 30	07 48	08 06	08 24	08 42	09 00
19	06 39	06 58	07 17	07 36	07 55	08 14	08 33	08 52	09 11	09 30
20	07 00	07 20	07 40	08 00	08 20	08 40	09 00	09 20	09 40	10 00
21	07 21	07 42	08 03	08 24	08 45	09 06	09 27	09 48	10 09	10 30
22	07 42	08 04	08 26	08 48	9 10	09 32	9 54	10 16	10 38	11 00
23	08 03	08 26	08 49	09 12	09 35	09 58	10 21	10 44	11 07	11 30
24	08 24	08 48	09 12	09 36	10 00	10 24	10 48	11 12	11 36	12 00
25	08 45	09 10	09 35	10 00	10 25	10 50	11 15	11 40	12 05	12 30
26	09 06	09 32	09 58	10 24	10 50	11 16	11 42	12 08	12 34	13 00
27	09 27	09 54	10 21	10 48	11 15	11 42	12 09	12 36	13 03	13 30
28	09 48	10 16	10 44	11 12	11 40	12 08	12 36	13 04	13 32	14 00
29	10 09	10 38	11 07	11 36	12 05	12 34	13 03	13 32	14 01	14 30
30	10 30	11 00	11 30	12 00	12 30	13 00	13 30	14 00	14 30	15 00
31	10 51	11 22	11 53	12 24	12 55	13 26	13 57	14 28	14 59	15 30
32	11 12	11 44	12 16	12 48	13 20	13 52	14 24	14 56	15 28	16 00
33	11 33	12 06	12 39	13 12	13 45	14 18	14 51	15 24	15 57	16 30
34	11 54	12 28	13 02	13 36	14 10	14 44	15 18	15 52	16 26	17 00
35	12 15	12 50	13 25	14 00	14 35	15 10	15 45	16 20	16 55	17 30
36	12 36	13 12	13 48	14 24	15 00	15 36	16 12	16 48	17 24	18 00
37	12 57	13 34	14 11	14 48	15 25	16 02	16 39	17 16	17 53	18 30
38	13 18	13 56	14 34	15 12	15 50	16 28	17 06	17 44	18 22	19 00
39	13 39	14 18	14 57	15 36	16 15	16 54	17 33	18 12	18 51	19 30
40	14 00	14 40	15 20	16 00	16 40	17 20	18 00	18 40	19 20	20 00
41	14 21	15 02	15 43	16 24	17 05	17 46	18 27	19 08	19 49	20 30
42	14 42	15 24	16 06	16 48	17 30	18 12	18 54	19 36	20 18	21 00
43	15 03	15 46	16 29	17 12	17 55	18 38	19 21	20 04	20 47	21 30
44	15 24	16 08	16 52	17 36	18 20	19 04	19 48	20 32	21 16	22 00
45	15 45	16 30	17 15	18 00	18 45	19 30	20 15	21 00	21 45	22 30
46	16 06	16 52	17 38	18 24	19 10	19 56	20 42	21 28	22 14	23 00
47	16 27	17 14	18 01	18 48	19 35	20 22	21 09	22 56	22 43	23 30
48	16 48	17 36	18 24	19 12	20 00	20 48	21 36	22 24	23 12	24 00
49	17 09	17 58	18 47	19 36	20 25	21 14	22 03	22 52	23 41	24 30
50	17 30	18 20	19 10	20 00	20 50	21 40	22 30	23 20	24 10	25 00
51	17 51	18 42	19 33	20 24	21 15	22 06	22 57	23 48	24 39	25 30
52	18 12	19 04	19 56	20 48	21 40	22 32	23 24	24 16	25 08	26 00
53	18 33	19 26	20 19	21 12	22 05	22 58	23 51	24 44	25 37	26 30
54	18 54	19 48	20 42	21 36	22 30	23 24	24 18	25 12	26 06	27 00
55	19 15	20 10	21 05	22 00	22 55	23 50	24 45	25 40	16 35	27 30
56	19 36	20 32	21 28	22 24	23 20	24 16	25 12	26 08	27 04	28 00
57	19 57	20 54	21 51	22 48	23 45	24 42	25 39	26 36	27 33	28 30
58	20 18	21 16	22 14	23 12	24 10	25 08	26 06	27 04	28 02	29 00
59	20 39	21 38	22 37	23 36	24 35	25 34	26 33	27 32	28 31	29 30
60	21 00	22 00	23 00	24 00	25 00	26 00	27 00	28 00	29 00	30 00

The Sexagenarie Table, serving for *Multiplication*, *Division*, and for finding the Part Proportionall.

	31	32	33	34	35	36	37	38	39	40
1	00 31	00 32	00 33	00 34	00 35	00 36	00 37	00 38	00 39	00 40
2	01 02	01 04	01 06	01 08	01 10	01 12	01 14	01 16	01 18	01 20
3	01 33	01 36	01 39	01 42	01 45	01 48	01 51	01 54	01 57	02 00
4	02 04	02 08	02 12	02 16	02 20	02 24	02 28	02 32	02 36	02 40
5	02 35	02 40	02 45	02 50	02 55	03 00	03 05	03 10	03 15	03 20
6	03 06	03 12	03 18	03 24	03 30	03 36	03 42	03 48	03 54	04 00
7	03 37	03 44	03 51	03 58	04 05	04 12	04 19	04 26	04 33	04 40
8	04 08	04 16	04 24	04 32	04 40	04 48	04 56	05 04	05 12	05 20
9	04 39	04 48	04 57	05 06	05 15	05 24	05 33	05 42	05 51	06 00
10	05 10	05 20	05 30	05 40	05 50	06 00	06 10	06 20	06 30	06 40
11	05 41	05 52	06 03	06 14	06 25	06 36	06 47	06 58	07 09	07 20
12	06 12	06 24	06 36	06 48	07 00	07 12	07 24	07 36	07 48	08 00
13	06 43	06 56	07 09	07 22	07 35	07 48	08 01	08 14	08 27	08 40
14	07 14	07 28	07 42	07 56	08 10	08 24	08 38	08 52	09 06	09 20
15	07 45	08 00	08 15	08 30	08 45	09 00	09 15	09 30	09 45	10 00
16	08 16	08 32	08 48	09 04	09 20	09 36	09 52	10 08	10 24	10 40
17	08 47	09 04	09 21	09 38	09 55	10 12	10 29	10 46	11 03	11 20
18	09 18	09 36	09 54	10 12	10 30	10 48	11 06	11 24	11 42	12 00
19	09 49	10 08	10 27	10 46	11 05	11 24	11 43	12 02	12 21	12 40
20	10 20	10 40	11 00	11 20	11 40	12 00	12 20	12 40	13 00	13 20
21	10 51	11 12	11 33	11 54	12 15	12 36	12 57	13 18	13 39	14 00
22	11 23	11 44	12 06	12 28	12 50	13 12	13 34	13 56	14 18	14 40
23	11 52	12 16	12 39	13 02	13 25	13 48	14 11	14 34	14 57	15 20
24	12 24	12 48	13 12	13 36	14 00	14 24	14 48	15 12	15 36	16 06
25	12 55	13 20	13 45	14 10	14 35	15 00	15 25	15 50	16 15	16 40
26	13 26	13 52	14 18	14 44	15 10	15 36	16 02	16 28	16 54	17 20
27	13 57	14 24	14 51	15 18	15 45	16 12	16 39	17 06	17 33	18 00
28	14 28	14 56	15 24	15 52	16 20	16 48	17 16	17 44	18 12	18 40
29	14 59	15 28	15 57	16 26	16 55	17 24	17 53	18 22	19 51	19 00
30	15 30	16 00	16 30	17 00	17 30	18 00	18 30	19 00	19 30	20 20
31	16 01	16 32	17 03	17 34	18 05	18 36	19 07	19 38	20 09	20 40
32	16 32	17 04	17 36	18 08	18 40	19 12	19 44	20 16	20 48	21 20
33	17 03	17 36	18 09	18 42	19 15	19 48	20 21	20 54	21 27	22 00
34	17 34	18 08	18 42	19 16	19 50	20 24	20 58	21 32	22 06	22 40
35	18 05	18 40	19 15	19 50	20 25	21 00	21 35	22 10	22 45	23 20
36	18 36	19 12	19 48	20 24	21 00	21 36	22 12	22 44	23 24	24 00
37	19 07	19 44	20 21	20 58	21 35	22 12	22 49	23 26	24 03	24 40
38	19 38	20 16	20 54	21 32	22 10	22 48	23 26	24 04	24 42	25 20
39	20 09	20 48	21 27	22 06	22 45	23 24	24 03	24 42	25 21	26 00
40	20 40	21 20	22 00	22 40	23 20	24 00	24 40	25 20	26 00	26 40
41	21 11	21 52	22 33	23 14	23 55	24 36	25 17	25 58	26 39	27 20
42	21 42	22 24	23 06	23 48	24 30	25 12	25 54	26 36	27 18	28 00
43	22 13	22 56	23 39	24 22	25 05	25 48	26 31	27 14	27 57	28 40
44	22 44	23 28	24 12	24 56	25 40	26 24	27 08	27 52	28 36	29 20
45	23 15	24 00	24 45	25 30	26 15	27 00	27 45	28 30	29 15	30 00
46	23 46	24 32	25 18	26 04	26 50	27 36	28 22	29 08	29 54	30 40
47	24 17	25 04	25 51	26 38	27 25	28 12	28 59	29 46	30 33	31 20
48	24 48	25 36	26 24	27 12	28 00	28 48	29 36	30 24	31 12	32 00
49	25 19	26 08	26 57	27 46	28 35	29 24	30 13	31 02	31 51	32 40
50	25 50	26 40	27 30	28 20	29 10	30 00	30 50	31 40	32 30	33 20
51	26 21	27 12	28 03	28 54	29 45	30 36	31 27	32 18	33 09	34 00
52	26 52	27 44	28 36	29 28	30 20	31 12	32 04	32 56	33 48	34 40
53	27 23	28 16	29 09	30 02	30 55	31 48	32 41	33 34	34 27	35 20
54	27 54	28 48	29 42	30 36	31 30	32 24	33 18	34 12	35 06	36 00
55	28 25	29 20	30 15	31 10	32 05	33 00	34 55	34 50	35 45	36 40
56	28 56	29 52	30 48	31 44	32 40	33 36	34 32	35 28	36 24	37 20
57	29 27	30 24	31 21	32 18	33 15	34 12	35 09	36 06	37 03	38 00
58	29 58	30 56	31 54	32 52	33 50	34 48	35 46	36 44	37 42	38 40
59	30 29	31 28	32 27	33 26	34 25	35 24	36 23	37 22	38 21	39 20
60	31 00	32 00	33 00	34 00	35 00	36 00	37 00	38 00	39 06	40 00

deg of decl	the Ascen difer	
1	1 15	1 15
2	2 31	16
3	3 47	16
4	5 03	16
5	6 19	16
6	7 36	17
7	8 53	17
8	10 11	18
9	11 30	19
10	12 49	19
11	14 10	21
12	15 31	21
13	16 53	22
14	18 17	24
15	19 43	26
16	21 09	26
17	22 38	29
18	24 08	30
19	25 41	33
20	27 16	35
21	28 54	38
22	30 34	40
23	32 18	44
24	34 05	47
25	35 53	48
26	37 52	59
27	39 53	2 01
28	42 00	07
29	44 14	14
30	46 37	23

The Sexagenarie Table, serving for *Multiplication*, *Division*, and for finding the Part Proportionall.

	41	42	43	44	45	46	47	48	49	50
1	00 41	00 42	00 43	00 44	00 45	00 46	00 47	00 48	00 49	00 50
2	01 22	01 24	01 26	01 28	01 30	01 32	01 34	01 36	01 38	01 40
3	02 03	02 06	02 09	02 12	02 15	02 18	02 21	02 24	02 27	02 30
4	02 44	02 48	02 52	02 56	03 00	03 04	03 08	03 12	03 16	03 20
5	03 25	03 30	03 35	03 40	03 45	03 50	03 55	04 00	04 05	04 10
6	04 06	04 12	04 18	04 24	04 30	04 36	04 42	04 48	04 54	05 00
7	04 47	04 54	05 01	05 08	05 15	05 22	05 29	05 36	05 43	05 50
8	05 28	05 36	05 44	05 52	06 00	06 08	06 16	06 24	06 32	06 40
9	06 09	06 18	06 27	06 36	06 45	06 54	07 03	07 12	07 21	07 30
10	06 50	07 00	07 10	07 20	07 30	07 40	07 50	08 00	08 10	08 20
11	07 31	07 42	07 53	08 04	08 15	08 26	08 37	08 48	08 59	09 10
12	08 12	08 24	08 36	08 48	09 00	09 12	09 24	09 36	09 48	10 00
13	08 53	09 06	09 19	09 32	09 45	09 58	10 11	10 24	10 37	10 50
14	09 34	09 48	10 02	10 16	10 30	10 44	10 58	11 12	11 26	11 40
15	10 15	10 30	10 45	11 00	11 15	11 30	11 45	12 00	12 15	12 30
16	10 56	11 12	11 28	11 44	12 00	12 16	12 32	12 48	13 04	13 20
17	11 37	11 54	12 11	12 28	12 45	13 02	13 19	13 36	13 53	14 10
18	12 18	12 36	12 54	13 12	13 30	13 48	14 06	14 24	14 42	15 00
19	12 59	13 18	13 37	13 56	14 15	14 34	14 53	15 12	15 31	15 50
20	13 40	14 00	14 20	14 40	15 00	15 20	15 40	16 00	16 20	16 40
21	14 21	14 42	15 03	15 24	15 45	16 06	16 27	16 48	17 09	17 30
22	15 02	15 24	15 46	16 08	16 30	16 52	17 14	17 36	17 58	18 20
23	15 43	16 06	16 29	16 52	17 15	17 38	18 01	18 24	18 47	19 10
24	16 24	16 48	17 12	17 36	18 00	18 24	18 48	19 12	19 36	20 00
25	17 05	17 30	17 55	18 20	18 45	19 10	19 35	20 00	20 25	20 50
26	17 46	18 12	18 38	19 04	19 30	19 56	20 22	20 48	21 14	21 40
27	18 27	18 54	19 21	19 48	20 15	20 42	21 09	21 36	22 03	22 30
28	19 08	19 36	20 04	20 32	21 00	21 28	21 56	22 24	22 52	23 20
29	19 49	20 18	20 47	21 16	21 45	22 14	22 43	23 12	23 41	24 10
30	20 30	21 00	21 30	22 00	22 30	23 00	23 30	24 00	24 30	25 00
31	21 11	21 42	22 13	22 44	23 15	23 46	24 17	24 48	25 19	25 50
32	21 52	22 24	22 56	23 28	24 00	24 32	25 04	25 36	26 08	26 40
33	22 33	23 06	23 39	24 12	24 45	25 18	25 51	26 24	26 57	27 30
34	23 14	23 48	24 22	24 56	25 30	26 04	26 38	27 12	27 46	28 20
35	23 55	24 30	25 05	25 40	26 15	26 50	27 25	28 00	28 35	29 10
36	24 36	25 12	25 48	26 24	27 00	27 36	28 12	28 48	29 24	30 00
37	25 17	25 54	26 31	27 08	27 45	28 22	28 59	29 36	30 13	30 50
38	25 58	26 36	27 14	27 52	28 30	29 08	29 46	30 24	31 02	31 40
39	26 39	27 18	27 57	28 36	29 15	29 54	30 33	31 12	31 51	32 30
40	27 20	28 00	28 40	29 20	30 00	30 40	31 20	32 00	32 40	33 20
41	28 01	28 42	29 23	30 04	30 45	31 26	32 07	32 48	33 29	34 10
42	28 42	29 24	30 06	30 48	31 30	32 12	32 54	33 36	34 18	35 00
43	29 23	30 06	30 49	31 32	32 15	32 58	33 41	34 24	35 07	35 50
44	30 04	30 48	31 32	32 16	33 00	33 44	34 28	35 12	35 56	36 40
45	30 45	31 30	32 15	33 00	33 45	34 30	35 15	36 00	36 45	37 30
46	31 26	32 12	32 58	33 44	34 30	35 16	36 02	36 48	37 34	38 20
47	32 07	32 54	33 41	34 28	35 15	36 02	36 49	37 36	38 23	39 10
48	32 48	33 36	34 24	35 12	36 00	36 48	37 36	38 24	39 12	40 00
49	33 29	34 18	35 07	35 56	36 45	37 34	38 23	39 12	40 01	40 50
50	34 10	35 00	35 50	36 40	37 30	38 20	39 10	40 00	40 50	41 40
51	34 51	35 42	36 33	37 24	38 15	39 06	39 57	40 48	41 39	42 30
52	35 32	36 24	37 16	38 08	39 00	39 52	40 44	41 36	42 28	43 20
53	36 13	37 06	37 59	38 52	39 45	40 38	41 31	42 24	43 17	44 10
54	36 54	37 48	38 42	39 36	40 30	41 24	42 18	43 12	44 06	45 00
55	37 35	38 30	39 25	40 20	41 15	42 10	43 05	44 00	44 55	45 50
56	38 16	39 12	40 08	41 04	42 00	42 56	43 52	44 48	45 44	46 40
57	38 57	39 54	40 51	41 48	42 45	43 42	44 39	45 36	46 33	47 30
58	39 38	40 36	41 34	42 32	43 30	44 28	45 26	46 24	47 22	48 20
59	40 19	41 18	42 17	43 16	44 15	45 14	46 13	47 12	48 11	49 10
60	41 00	42 00	43 00	44 00	45 00	46 00	47 00	48 00	49 00	50 00

The Sexagenarie Table, serving for *Multiplication*, *Division*, and for finding the Part Proportionall.

	51	52	53	54	55	56	57	58	59	60
1	00 51	00 52	00 53	00 54	00 55	00 56	00 57	00 58	00 59	01 00
2	01 42	01 44	01 46	01 48	01 50	01 52	01 54	01 56	01 58	02 00
3	02 33	02 36	02 39	02 42	02 45	02 48	02 51	02 54	02 57	03 00
4	03 24	03 28	03 32	03 36	03 40	03 44	03 48	03 52	03 56	04 00
5	04 15	04 20	04 25	04 30	04 35	04 40	04 45	04 50	04 55	05 00
6	05 06	05 12	05 18	05 24	05 30	05 36	05 42	05 48	05 54	06 00
7	05 57	06 04	06 11	06 18	06 25	06 32	06 39	06 46	06 53	07 00
8	06 48	06 56	07 04	07 12	07 20	07 28	07 36	07 44	07 52	08 00
9	07 39	07 48	07 57	08 06	08 15	08 24	08 33	08 42	08 51	09 00
10	08 30	08 40	08 50	09 00	09 10	09 20	09 30	09 40	09 50	10 00
11	09 21	09 32	09 43	09 54	10 05	10 16	10 27	10 38	10 49	11 00
12	10 12	10 24	10 36	10 48	11 00	11 12	11 24	11 36	11 48	12 00
13	11 03	11 16	11 29	11 42	11 55	12 08	12 21	12 34	12 47	13 00
14	11 54	12 08	12 22	12 36	12 50	13 04	13 18	13 32	13 46	14 00
15	12 45	13 00	13 15	13 20	13 45	14 00	14 15	14 30	14 45	15 00
16	13 36	13 52	14 08	14 24	14 40	14 56	15 12	15 28	15 44	16 00
17	14 27	14 44	15 01	15 18	15 35	15 52	16 09	16 26	16 43	17 00
18	15 18	15 36	15 54	16 12	16 30	16 48	17 06	17 24	17 42	18 00
19	16 09	16 28	16 47	17 06	17 25	17 44	18 03	18 22	18 41	19 00
20	17 00	17 20	17 40	18 00	18 20	18 40	19 00	19 20	19 40	20 00
21	17 51	18 12	18 33	18 54	19 15	19 36	19 57	20 18	20 39	21 00
22	18 42	19 04	19 26	19 48	20 10	20 32	20 54	21 16	21 38	22 00
23	19 33	19 56	20 19	20 42	21 05	21 28	21 51	22 14	22 37	23 00
24	20 24	20 48	21 12	21 36	22 00	22 24	22 48	23 12	23 36	24 00
25	21 15	21 40	22 05	22 30	22 55	23 20	23 45	24 10	24 35	25 00
26	22 06	22 32	22 58	23 24	23 50	24 16	24 42	25 08	25 34	26 00
27	22 57	23 24	23 51	24 18	24 45	25 12	25 39	26 06	26 33	27 00
28	23 48	24 16	24 44	25 12	25 40	26 08	26 36	27 04	27 32	28 00
29	24 39	25 08	25 37	26 06	26 35	27 04	27 33	28 02	28 31	29 00
30	25 30	26 00	26 30	27 00	27 30	28 00	28 30	29 00	29 30	30 00
31	26 21	26 52	27 23	27 54	28 25	28 56	29 27	29 58	30 29	31 00
32	27 12	27 44	28 16	28 48	29 20	29 52	30 24	30 56	31 28	32 00
33	28 03	28 36	29 09	29 42	30 15	30 48	31 21	31 54	32 27	33 00
34	28 54	29 28	30 02	30 36	31 10	31 44	32 18	32 52	33 26	34 00
35	29 45	30 20	30 55	31 30	32 05	32 40	33 15	33 50	34 25	35 00
36	30 36	31 12	31 48	32 24	33 00	33 36	34 12	34 48	35 24	36 00
37	31 27	32 04	32 41	33 18	33 55	34 32	35 09	35 46	36 23	37 00
38	32 18	32 56	33 34	34 12	34 50	35 28	36 06	36 44	37 22	38 00
39	33 09	33 48	34 27	35 06	35 45	36 24	37 03	37 42	38 21	39 00
40	34 00	34 40	35 20	36 00	36 40	37 20	38 00	38 40	39 20	40 00
41	34 51	35 32	36 13	36 54	37 35	38 16	38 57	39 38	40 19	41 00
42	35 42	36 24	37 06	37 48	38 30	39 12	39 54	40 36	41 18	42 00
43	36 33	37 16	37 59	38 42	39 25	40 08	40 51	41 34	42 17	43 00
44	37 24	38 08	38 52	39 36	40 20	41 04	41 48	42 32	43 16	44 00
45	38 15	39 00	39 45	40 30	41 15	42 00	42 45	43 30	44 15	45 00
46	39 06	39 52	40 38	41 24	42 10	42 56	43 42	44 28	45 14	46 00
47	39 57	40 44	41 31	42 18	43 05	43 52	44 39	45 26	46 13	47 00
48	40 48	41 36	42 24	43 12	44 00	44 48	45 36	46 24	47 12	48 00
49	41 39	42 28	43 17	44 06	44 55	45 44	46 33	47 22	48 11	49 00
50	42 30	43 20	44 10	45 00	45 50	46 40	47 30	48 20	49 10	50 00
51	43 21	44 12	45 03	45 54	46 45	47 36	48 27	49 18	50 09	51 00
52	44 12	45 04	45 56	46 48	47 40	48 32	49 24	50 16	51 08	52 00
53	45 03	45 56	46 49	47 42	48 35	49 28	50 21	51 14	52 07	53 00
54	45 54	46 48	47 42	48 36	49 30	50 24	51 18	52 12	53 06	54 00
55	46 45	47 40	48 35	49 30	50 25	51 20	52 15	53 10	54 05	55 00
56	47 36	48 32	49 28	50 24	51 20	52 16	53 12	54 08	55 04	56 00
57	48 27	49 24	50 21	51 18	52 15	53 12	54 09	55 06	56 03	57 00
58	49 18	50 16	51 14	52 12	53 10	54 08	55 06	56 04	57 02	58 00
59	50 09	51 08	52 07	53 06	54 05	55 04	56 03	57 02	58 01	59 00
60	51 00	52 00	53 00	54 00	55 00	56 00	57 00	58 00	59 00	60 00

A
CATALOGUE *of a Thousand of the fixed* Stars, *according to the accurate Observations of the late Tres-noble Dane*, TYCHO BRAHE, *and by him rectified to the beginning of the Year of Mans Redemption* 1601.

And first of them which are placed in the *Zodiaque*.

ARIES; *The Ramme.*

Denomination of the Stars.	Longitude D	′	S	Latitude D	′		M
(the first star ♈.)							
THe southern in the former Horn (cal'd	27	37	♈	7	8	N	4
The northern following in the sam horn	28	23	♈	8	29	N	4
The bright star in the top of the Head	2	6	♉	9	57	N	3
The northern of the two in the Jaw	2	34	♉	7	23	N	6
The * which is more towards the South	3	20	♉	5	42½	N	6
That in the hinder part of the Neck.	27	57	♈	5	24	N	5
In the Reins.	8	36	♉	6	7	N	6
In the eduction of the tail	12	57	♉	4	8	N	5
The former of the three in the tail	15	15	♉	1	46½	N	4
The middle	16	27	♉	2	50	N	5
The last	17	50½	♉	2	36	N	6
In the thigh	11	22	♉	1	12	N	6
In the Hamme	9	35	♉	1	7	N	6
In the left Khee	9	23	♉	1	30	S	6
In the right Knee	7	52	♉	0	39	S	6
The little star in the Belly	8	46	♉	4	1	N	6
Below the bright star of the Head	1	41	♉	9	13½	N	6
The former upon the back of the four without form	10	35	♉	10	50⅓	N	5
The following frō them that follow at the Bse of vvest △	11	23	♉	11	16	N	4
The eastern in the base of the Triangle	12	40	♉	10	24	N	3
In the Crovvn of the said △ tovvards the north	12	51	♉	12	25⅓	N	4

TAURUS; *The Bull.*

THe highest in the Section	18	0	♉	5	57	S	5
The follovving	17	30	♉	7	29	S	6
The third	16	18	♉	8	49⅓	S	4

The

Denomination of the Stars.	Longitude D ′ S	Latitude D ′ S	M
The fourth more South.	15 35½ ♉	9 22½ S	4
In the right shoulder.	21 46 ♉	8 41 S	4
In the Breast.	25 1 ♉	8 3 S	4
In the right Knee.	27 59 ♉	12 13½ S	4
In the right Hough.	24 19 ♉	14 30½ S	4
In the left Knee.	4 9 ♊	9 32 S	5
In the left Hough.	3 11 ♊	11 48 S	5
In the face: the first of suc. in the nostrils.	0 12 ♊	5 46 S	3
Between this and the North eye.	1 16½ ♊	4 2 S	3
Between the same and the South eye.	2 22 ♊	5 53 S	4
In the South eye: *Aldebaran, Palilitium.*	4 12½ ♊	5 31 S	1
In the North eye.	2 53 ♊	2 36½ S	3
At the Root of the South Horn.	8 12 ♊	3 40 S	6
The southern of the second in the same Horn.	12 13 ♊	2 30 S	6
That more towards the North.	11 4 ♊	1 49 S	4
In the extremity thereof.	19 12 ♊	2 14 S	3
In the beginning of the North Horn.	6 35 ♊	0 40 N	5
The northward of the 2 in the ear.	2 54 ♊	1 4 N	5
That southward.	2 38 ♊	0 35 N	4
The former of the two in the neck.	27 51 ♉	1 12 N	5
That which followeth.	0 28 ♊	0 46½ S	6
The southern in the hinder part of the neck.	0 4 ♊	5 16 N	6
In the common extremity with the right foot of *Henio.*	16 59½ ♊	5 20 N	2
The northern of the same side.	29 49½ ♉	7 55 N	5
The southern of the following side.	2 34 ♊	3 57 N	5
The northern of this side. (*Pleiades.*	2 29 ♊	5 45½ N	5
The brighter ✳ of the 3 towards the West amongst the	23 50 ♉	4 11 N	5
The lowest toward the Western of them.	24 3 ♉	4 2 N	6
The middle and brightest of them.	24 24 ♉	4 0 N	3
That in the point towards the East.	24 47 ♉	3 55 N	5
In the hoof of the left foot.	19 57 ♉	13 30 S	6
The little star in the ankle of the following foot.	0 10 ♊	12 2 S	6
In the right shoulder.	1 58½ ♊	8 41 S	5
The former of the three below *Sucula.*	2 42 ♊	6 56½ S	5
The middlemost.	3 28 ♊	7 4 S	5
The following.	4 55 ♊	6 17½ S	5
The little star in the South Horn.	15 2 ♊	1 4 S	6
The following in the same Horn.	16 55½ ♊	1 20 S	6
The little star following the four in the section.	17 33 ♉	9 34½ S	6
The preceding of the two in the □ of the neck.	29 22½ ♉	6 33 N	5

GEMINI; *The Twins.*

IN the higher head, *Castor, Apollo.*	14 41 ♋	10 2 N	2
In the lower head, *Pollux, Hercules.*	17 43 ♋	6 38 N	2
In the left hand of the former Twin,	5 32 ♋	10 58 N	5
In the left shoulder.	9 54 ♋	7 43 N	4
In the shoulder blade of the same.	13 24 ♋	5 42 N	4
In the right shoulder.	15 47 ♋	5 10 N	5
In the left shoulder of the following Twin.	18 6 ♋	3 3 N	4
In the right side of the former Twin.	13 18 ♋	2 56 N	6
The little star in the left elboe of the higher Twin.	14 10 ♋	6 0 N	6
In the Northern and supream Knee.	4 22 ♋	2 11½ N	3

Denomination of the Stars.	*Longitude* D	′	S	*Latitude* D	′		*M*
In the left Knee of the following Twin	9	26	♋	2	6½	S	3
In the Belly of the southern Twin	12	56	♋	0	13	S	3
In the Hamme of the lower Twin	13	13	♋	5	41	S	4
The first in the foot of the former Twin	27	58	♊	0	58	S	4
The following star in the same foot call'd the Heel	29	44	♊	0	53	S	3
In the end of the right foot of the former twin	1	14	♋	0	8	S	4
The light star of the foot	3	51	♋	6	48½	S	2
In the lower foot of the following twin	5	29½	♋	10	9	S	4
In the Heel of the same foot	7	56	♋	9	41	S	6
Above the Knee of the lower twin	6	23	♋	1	12	S	6
In the thigh of the higher twin	8	37	♋	1	31	N	6
Beneath the Head, lower in the hand	19	42	♋	5	44	N	6
The little star between both Heads	17	4	♋	7	24	N	5
About the ear of the higher twin	13	29	♋	9	42	N	5
The former at the top of the foot πρόπους	25	22	♊	0	31	S	4
The lowest of the five preceding between the twins	17	2½	♋	5	52	S	6
The following above the same	18	6	♋	3	48½	S	6
The third	19	30½	♋	2	42	S	6
The fourth	12	28	♋	0	57½	S	6
The last	23	54	♋	1	18½	N	6

CANCER *A Crab-fish.*

THe Cloud in the Breast, called *Presepe*	1	46½	♌	1	14	N	clo
The northern of them that precede in □ of ♋	29	49	♋	1	31½	N	5
The more South	0	9½	♌	0	47½	S	5
The North *Asellus*	1	57	♌	3	8	N	4
The South *Asellus.*	3	8	♌	0	4	N	4
In the South Arm	8	3½	♌	5	8	S	3
In the North Arm	0	44	♌	10	23	N	5
In the extremity of the North-Foot	23	56	♋	1	15½	N	5
In the extremity of the South-Foot	25	4	♋	7	5	S	5
The lighter in the root of the tail	25	45½	♋	2	18½	S	4
The next following in the Back	28	12½	♋	1	4	S	6
The northern of the three in the South arm	6	47½	♌	1	54	S	6
The Southern in the same arm	10	36	♌	5	36	S	5
The Northern of the two in the Back	5	27	♌	7	14	N	6
The lower towards the South	7	36½	♌	5	20	N	6

LEO, *The Lion.*

IN the Nostril	9	41½	♌	10	23	N	4
In the opening of the mouth	12	16½	♌	7	52	N	4
The more northern of the two in the Head	15	51	♌	12	21	N	4
The southern	15	5	♌	9	40	N	3
The northern of the three in the neck.	21	57½	♌	11	50	N	3
The middle and brightest star of the neck	23	59	♌	8	47	N	2
That towards the South	22	20	♌	4	52	N	3
The Heart: *Regulus* βασιλίσκος	24	17	♌	0	26	N	1
The southern in the Breast.	24	50½	♌	1	25	S	5
That going before next *Regulus*	21	43½	♌	0	0	N	4
That precedeth this in the right Knee	17	54½	♌	0	16	N	5

In

Denomination of the Stars.	Longitude D	'	S	Latitude D	'		M
In drace dextra	16	7	♌	3	10	S	4
The following star in the other foot	18	40	♌	3	47	S	4
In drace sinistra	23	46	♌	3	55	S	4
In the left arm-hole	0	48	♍	0	8	N	4
The first of the three in the belly	22	24	♌	2	10	N	6
That more North of them that follow	2	6	♍	5	56	N	6
The more southern	4	5	♍	2	49	N	6
The former of the two in the Loyns	3	14	♍	12	53	N	5
The light star which followeth	5	41	♍	14	20	N	2
The northern and preceding of the two in the Buttock	7	50	♍	9	41½	N	3
The following and southern star	9	8	♍	7	50½	N	6
In the Thigh	11	58½	♍	6	7	N	3
In the latter Knee	13	8½	♍	1	40	N	4
The middle star in the foot	15	57	♍	0	33	S	4
The lowest star in the foot	19	27	♍	3	2½	S	4
In the extream of the light tail	16	3	♍	12	18	N	1
The extream star in the Hoof of the left foot	16	32	♌	4	48	S	6
In the Hoof of the other foot preceding	16	1½	♌	5	43	S	5
That almost in the mid-body	0	14	♍	10	17	N	6
A little star in the Head	16	13	♌	10	47½	N	6
The first of the two in the latter left foot	15	53½	♍	7	39	S	4
That following	18	50	♍	5	41	S	5
The preceding of the two without shape on the Back	26	22½	♌	17	40	N	5
That following	29	57	♌	16	30	N	5
That above the light star in the Back	4	54½	♍	16	47	N	5
Above the tail of ♌, or rather in the right hand of ♍.	13	22	♍	17	19	N	4
The northern of the three under the belly	8	58	♍	1	20½	N	4
The middlemost	8	30	♍	0	9½	S	5
The southern of the three	9	20	♍	2	29	S	5

VIRGO; *The Virgine.*

THe northern of those that go before in □ of the Head	17	44	♍	6	6½	N	5
The southern	18	33	♍	4	37	N	5
The northern of the two following stars *in vultu*.	22	7	♍	8	33½	N	5
The southern	21	58	♍	6	10	N	5
In the end of the South and left Wing	21	32	♍	0	43	N	3
The former of the four in the south Wing	29	16	♍	1	25	N	4
The other following	4	35	♎	2	50	N	3
A little star, the last but one	9	28	♎	2	23½	N	6
The last	12	37	♎	1	45	N	4
In the right side under the Girdle	5	55	♎	8	41	N	3
The preceding of the 3 in the right and northern Wing	29	53	♍	13	36½	N	5
The southern of the two other	1	52	♎	11	37	N	6
The more northern, called *Vindemiatrix*	4	23	♎	16	15½	N	3
In the left hand. *Spica*	18	16	♎	1	59	S	1
Under the Breech in the right Buttock	15	22	♎	8	10	N	3
The northermost in the left hand	17	58	♎	3	11	N	6
The more northern of the two following	21	9	♎	1	45½	N	6
The more southern	19	44	♎	0	19½	S	6
In the left knee	24	44	♎	2	24½	N	6
The northern of the two in the higher skirt	27	49	♎	11	2	N	5
The middle of the three in the skirt	28	9	♎	7	18½	N	4

Denomination of the Stars.	Longitude D	'	S	Latitude D	'		M
The lowest and southern	28	51	♎	2	57	N	4
The more southern of the two in the higher skirt	29	51	♎	11	48½	N	4
In the Sonth foot	1	22½	♏	0	31½	N	4
In the Northern and right foot	4	30	♏	9	49	N	4
The lower of the two between *Vin:* and the Girdle	1	21	♎	10	26	N	6
The star following the same in the right buttock	21	37	♎	9	40½	N	6
In the hinder part of the neck	27	45	♏	4	59½	N	6
The little star following *Vindemiatrix*	8	25	♎	16	14	N	6
The first of the three in the right line of the North Wing	10	11	♎	12	40	N	5
The middle of them	14	46	♎	12	34½	N	6
The following	22	11	♎	13	7	N	5
That which is between the fourth and the fifth	22	56½	♍	3	32½	N	6
That without form under the left arm, &c.	6	38	♎	3	25½	S	5
The middle	10	39	♎	3	23	S	5
The following	14	8½	♎	3	13½	S	5
The former of the three under the ♍ spick	17	13	♎	7	51	S	5
The middlemost towards the South	19	35	♎	9	16	S	5
The star following more East	20	35½	♎	6	16½	S	5

LIBRA; *The Ballance.*

THe South Ballance	9	31	♏	0	26	N	2
That above the South Ballance	8	42	♏	1	55	N	5
The North Ballance	13	48	♏	8	35	N	2
That above the North Ballance towards the West	9	40½	♏	8	18½	N	4
The first from the South Ballance towards the East	12	26½	♏	1	24	N	5
The second from the said Ballance towards the East	16	19	♏	2	58½	N	6
The third from the said Ballance towards the East	19	33	♏	4	28	N	3
That below this towards the East	21	48½	♏	4	4	N	4
That below the same towards the West	19	27	♏	2	21	N	4
The star below the North Ballance to the East	15	46	♏	8	7	N	4
The higher of the two stars below the South Ballance	24	11	♏	0	2½	N	4
The lower of the same	25	3½	♏	0	7	N	4
After this, the preceding of the three in a right line	24	16	♏	3	33	N	4
The middle	24	48	♏	6	10	N	4
The higher and more Eastern	25	41½	♏	9	19	N	4
That which followeth	27	19	♏	10	57	N	5
In the left Arm under the North Ballance	15	8	♏	7	37	S	3
That following it	15	27	♏	1	48	S	3

SCORPIO; *The Scorpion.*

THe highest in the forehead	27	36	♏	1	5	N	3
The middle in the forehead	26	59	♏	1	54½	S	3
The Southern of the 3 lighter stars in the forehead	27	25	♏	5	22½	S	3
That more towards the South in the foot	27	43½	♏	8	27½	S	4
The Northermost star of the forehead	29	3½	♏	1	42	N	4
The little star in △ with the light star of the forehead	28	7	♏	0	14	N	5
That preceeding the heart towards the North	2	11	♐	3	55	S	4
The glittering star in the middle, the Heart *Antares*	4	13	♐	4	27	S	1
The star following the heart towards the South	5	53	♐	5	50	S	4
Amongst the preceding lower feet	0	46½	♐	6	37½	S	5

SAGITARIUS

Denomination of the Stars.	*Longitude* D	'	S	*Latitude* D	'		M

SAGITARIUS; *The Archer.*

The more South of the 2 in the North part of the Bow	0	$47\frac{1}{2}$	♑	2	0	S	4
That more North in the same part of the Bow	27	41	♐	2	$27\frac{1}{2}$	N	4
In the left shoulder	6	51	♑	3	31	S	4
The star going before this in the Dart or Arrow	4	40	♑	3	50	S	5
The former of the three in the Head	7	$56\frac{1}{2}$	♑	1	$24\frac{1}{2}$	N	4
The middle	9	28	♑	0	59	N	4
The last	10	43	♑	1	31	N	4
The first in the Contact	12	44	♑	3	$6\frac{1}{2}$	N	6
The middle in the North Contact	13	$54\frac{1}{2}$	♑	4	17	N	4
The following and higher	14	11	♑	6	$9\frac{1}{2}$	N	5
The more Eastern subjoyned to two obscure stars in form	19	$8\frac{1}{2}$	♑	5	8	N	6
The Eastern and last in the higher Contact (of a △	22	$52\frac{1}{2}$	♑	5	12	N	6
The obscure star in the lower Contact to the East	19	24	♑	1	25	N	6
The obscure star in the right Elboe	16	26	♑	3	8	S	6

CAPRICORNUS; *The Hee-Goat.*

The northern of the three in the former Horn	28	18	♑	7	$2\frac{1}{2}$	N	3
The middle	28	51	♑	6	53	N	6
The southern	28	31	♑	4	41	N	3
The cloudy star above the former Horn	27	8	♑	7	16	N	6
The cloudy star of the Base of △ in the front	28	57	♑	0	$48\frac{1}{2}$	N	clo
The cloudy star Eastern	29	41	♑	0	28	N	clo
The highest in the same △	29	37	♑	1	20	N	6
The cloudy star preceding in the front	27	13	♑	0	24	N	clo
The northern of the two in the neck	2	49	♒	3	25	N	6
The Southern	2	6	♒	0	15	N	6
The obscure star preceding in the right knee	1	47	♒	6	58	S	6
The following star in the left knee	2	28	♒	9	2	S	6
In the left Arm.	6	13	♒	8	8	S	6
The lowest in the Belly (the Paunch.	11	$24\frac{1}{2}$	♒	6	56	S	5
The Northern following star of the 2 neer together under	12	0	♒	6	29	S	6
More Eastern of the three in the mid-belly	9	23	♒	4	25	S	6
The lowest of them	7	31	♒	4	27	S	6
The northern of the three	7	18	♒	3	1	S	5
The former of the two in the Back	8	21	♒	0	29	S	5
The following star of them in the Back	12	7	♒	1	$16\frac{1}{2}$	S	5
The preceding of the two towards the Flanck	14	25	♒	4	48	S	4
That following	16	6	♒	4	49	S	5
The first of the two bright stars in the tail	16	14	♒	2	26	S	3
That succeeding	18	0	♒	2	29	S	3
The former in the higher tail	18	14	♒	2	22	N	5
The more southern of the rest in the higher tail	20	27	♒	0	$14\frac{1}{2}$	S	5
The star going before this towards the North	20	16	♒	0	10	S	6
The northern in the end of the tail	19	54	♒	4	17	N	6

A-

Denomination of the Stars.	Longitude D	'	S	Latitude D	'		M

AQUARIUS; *The Water-bearer.*

Denomination of the Stars	Longitude D	'	S	Latitude D	'		M
IN the head	22	26½	♒	15	23	N	6
The brighter star in the right shoulder	27	49½	♒	10	42	N	3
The more obscure star more Southward	26	36	♒	9	11	N	5
In the left shoulder	17	49	♒	8	42	N	3
In the Back under the arm-hole	18	38	♒	6	0	N	5
The following and lower of the three in the left hand	18	51	♒	4	50	N	5
The middlemost	7	28½	♒	8	19	N	5
The brighter star going before	6	12	♒	8	10	N	4
In the right elboe	1	10	♓	8	17	N	3
That more North in the right hand	3	4½	♓	10	31	N	5
The former of the other two southern stars	3	23	♓	8	52	N	4
That following	4	53	♓	8	10	N	4
The former of the two in the right hand *Cap.*	27	45	♒	2	46	N	4
The following of them	28	31	♒	2	29	N	6
In the right thigh	29	53	♒	1	10	S	5
That at the Buttocks	23	13	♒	2	0	S	4
The southern star in the right shank sheat	3	22	♓	8	10	S	3
The northern, or star at the knee	3	5	♓	5	46	S	5
In the left Hip	29	40	♒	5	40	S	6
The more southern of the two in the left knee	26	55½	♒	10	48	S	5
The more northern	29	50	♒	9	57	S	6
In the pouring out of the water	3	52	♓	4	8	S	4
The succeeding South	6	4	♓	0	19	S	4
The following star in the first bending of the water	9	0	♓	1	24	S	6
The other which accompanieth the same	11	38	♓	1	0	S	5
In the other South bending	11	33	♓	2	49	S	5
The former and more North of the two following	10	43	♓	3	58	S	5
The following more South	11	11	♓	4	10	S	5
Neer this declining towards the South	11	14½	♓	4	44	S	5
The preceding of the two neer together	14	7	♓	10	59	S	5
The following of them	14	38	♓	11	33	S	5
The Northern of the 3 in the 3d bending of the water	13	3	♓	14	29	S	5
The middle star in the third bending of the water	13	46	♓	15	16	S	6
The following and southern of the three	14	44	♓	16	23	S	6
The northern of the three following stars	7	54½	♓	14	45	S	5
The middlemost of the same three	8	21	♓	15	30	S	5
The southern of these three	9	50	♓	16	31	S	5
The higher of the three stars in the last bending	4	25	♓	14	25	S	5
The middlemost	4	2	♓	15	40	S	5
The lowest next *Fomahant*	3	17	♓	15	53	S	5
The last in the effusion *Fomahant*	28	11½	♓	21	0	S	1

PISCES; *Fishes.*

Denomination of the Stars	Longitude D	'	S	Latitude D	'		M
IN the mouth of the south Fish	13	2	♓	9	4	N	5
The southern of the 2, in the hinder part of the head	15	50½	♓	7	17½	N	4
The northern in the hinder part of the head	17	30½	♓	8	54½	N	6
The former of the 2 in the Back	19	42	♓	9	3	N	5
The following star in the Back	21	56½	♓	7	13	N	5

That

Denomination of the Stars.	*Longitude* D	′	S	*Latitude* D	′	S	M
That which goeth before in the Paunch	17	21	♓	4	23	N	5
That which followeth in the Paunch	21	5	♓	3	35	N	5
In the tail	27	2	♓	6	23	N	5
Above this towards the East	28	27	♓	7	27	N	6
The following *	2	29	♈	5	28	N	6
The preceding of the three lighter in the south line	8	36	♈	2	11	N	4
The middlemost of them	11	58	♈	1	5	N	4
The following (bending of the net	14	19	♈	0	57	N	4
The northern going before of the second small * in the	12	25	♈	1	31	S	6
The following of them towards the south	13	46	♈	4	19	S	6
The former of the 3 after the bending	17	33	♈	3	3	S	5
The middle	19	56	♈	4	40	S	5
The following and last	21	57½	♈	7	56	S	5
The brighter in the joyning together of both nets	23	47	♈	9	4	S	3
The former in the north line from the knot	22	12	♈	1	38	N	5
After this the southern of the three	21	16	♈	1	51	N	5
The middle and brighter in the north knot	21	16	♈	5	21	N	4
The northern of the three, and the last in the net	21	36½	♈	9	24	N	5
The northern of the 2, in the mouth of the north Fish	23	15	♈	22	0	N	6
The southern	22	49½	♈	20	43	N	5
The northern in the head of the triangle	19	22½	♈	20	55	N	6
The southern of the same triangle	18	6½	♈	19	24	N	6
The middle and formost * of the triangle	17	3½	♈	20	24	N	6
The preceding of the 3, in the south throat neer the elbow	17	56	♈	13	21	N	5
The middlemost (of *Andromeda*	18	2½	♈	20	21	N	6
The lowest of the three	18	9	♈	11	21	N	6
The northern of the 2 in the Belly	3	18	♈	17	26	N	5
That more toward the south	20	58	♈	15	30	N	5
That following the middle of the 3 in the south	19	0	♈	12	27	N	5
That following the northern * in the belly to the north	4	11	♈	18	31	N	6
In the hinder part of the head of the north Fish	21	41	♈	23	3	N	6

The Second Part of the Catalogue, conteining the Northern Images of the fixed Stars.

CYNOSURA; *or the lesser Bear.*

IN the end of the tail *Vulgò Polaris*	23	2½	♊	66	2	N	2
The last star of the tail but one	25	36	♊	69	50	N	4
The star in the root of the tail	3	24	♋	73	50	N	4
The higher of the 2 in □ of them that follow	21	29	♋	75	0	N	4
The lower of the same	24	52	♋	77	38½	N	5
The higher of the two in □ of them that precede.	7	16½	♌	72	51	N	2
The lower of the same.	14	41	♌	75	23	N	3
The informed of the two South at the head of the Bear.	2	54	♌	71	23	N	6
That placed above the same.	27	20½	♋	70	18	N	6

The

Denomination of the Stars.	*Longitude* D	′	S	*Latitude* D	′		M
The first of those without form which are in a right line (with the Pole	17	17	♊	35	50	N	6
The second of them	17	28	♊	37	20	N	6
The third, (being and obscure *)	17	45	♊	40	13	N	6
The fourth	18	3	♊	42	56	N	6
The first of them without form about the Pole	21	38	♋	57	55	N	6
The second of them	21	55	♊	70	42	N	6
The third	24	31	♊	69	8	N	6
The fourth	15	7	♊	88	4	N	6
The fifth	7	22	♊	67	43	N	6
The sixth	9	57	♊	67	22	N	6
That neerest the Pole	26	30	♊	63	55	N	6

HELICE; *The Greater Beare.*

That in the Snowt	17	36½	♋	40	2	N	4
Under the left Eye	17	10	♋	43	55	N	4
That very neer under this	6	8	♋	44	22	N	5
Above the right Eye	18	25	♋	47	50	N	4
Above the left Eye	19	44	♋	47	44	N	4
Neer the left Eare	24	42	♋	51	36	N	5
The lowest and former in the little △ of the Neck	23	50	♋	42	30	N	5
That following in the same △	25	2	♋	45	3	N	4
The highest in the top of the said △	28	00	♋	46	21	N	5
In the Neck, succeeding the said Triangle	00	38	♌	42	36	N	4
The following * below this	3	38½	♌	38	15	N	4
In the left Knee going before	00	32½	♌	34	34	N	3
The more northern of the 2 in the right Foot	25	56	♋	29	15	N	3
The more southern	27	10	♋	28	38	N	3
Below the right Knee	27	7	♋	33	30	N	5
In the right Knee	27	26	♋	36	6	N	5
The higher of them that goe before in the greater □	9	34	♌	49	40	N	2
The lower of the same □	13	43½	♌	45	3	N	2
The higher of those following □	25	25½	♌	51	37	N	2
The lower of them	24	45	♌	47	6	N	2
The higher of the latter * of the left Foot	13	56	♌	29	51	N	4
The following and more southern *	15	4½	♌	28	45	N	4
In the preceding Knee of the hinder Feet	22	33	♌	35	14	N	4
The former of the 2 * following in the right Foot	00	55	♍	26	14	N	4
The following and more southern	1	36	♍	24	54	N	4
The last but 2 of the Taile	3	10	♍	54	18	N	2
The last but one of the Taile	9	56½	♍	56	22	N	2
The last of the Taile	21	12	♍	54	25	N	2
That without shape between the Taile of this, & the Lion	17	43	♍	40	6	N	2
That in the Buttocke	28	10	♌	41	30	N	4
In the left Foot behinde	21	2	♌	33	1	N	5
That without form between the Bear and the Lions Head	6	17	♌	17	55	N	3
The * above this towards the East	8	10	♌	20	42	N	4
The * that goeth before this	5	00	♌	20	5	N	4
The following of the 2 before these	1	57	♌	20	51	N	4
The former of them	29	42	♋	23	41	N	4
Between the extream Foot and the Head of the Lion	6	17	♌	17	55	N	4
The north * followng	18	55	♌	25	4	N	4
The south * following	19	57	♌	24	59	N	5

The

Denomination of the Stars.	Longitude D	′	S	Latitude D	′		M
The former of the two in the Base of the *Oxygonium*	23	22	♌	21	28	N	3
That following	26	9	♌	20	44	N	3
The third northern star in the *Oxygonium*	25	19	♌	24	58	N	4
That between the legs of the Bear	12	16	♍	40	30	N	5
The first between the tail and the body	21	29	♋	58	8	N	6
The second	23	55	♋	47	14	N	6
The third	19	49	♋	47	30	N	6
The first between the Bear and the Lions Head	23	17	♋	46	50	N	6
The second	3	58	♌	47	55	N	6
The third	6	0	♍	48	40	N	6
The fourth	6	30	♍	49	42	N	6
The fifth	6	19	♍	49	42	N	6
The sixth	19	5	♍	49	0	N	6
The seventh	18	1	♍	49	27	N	6
The eighth	25	42	♍	48	11	N	6
The ninth	16	2	♍	52	25	N	6
The little star that toucheth the Hip	1	41	♌	35	40	N	6

The Dragon.

THat in the tongue	18	56½	♏	76	17	N	4
In the mouth	4	14½	♐	78	15	N	4
The former of the two bright stars in the Head	6	19	♐	75	21½	N	3
That neer the eye lid	19	3	♐	80	21	N	4
The following of the bright star, *vulgò lucida capitis*	22	24	♐	75	3½	N	3
The more northern of the three in the first inflexion of (the neck	17	4	♑	81	53	N	5
The southern	24	31	♑	77	57	N	5
The middle of them	20	33	♑	79	51½	N	5
That following towards the East	9	29	♒	80	53	N	4
That neer the second flexure	28	32½	♓	81	51	N	4
The northern of the second flexure of the □	12	26	♈	82	49	N	3
The northern of the followieg side	15	21	♈	78	9	N	4
The southern of the same side	27	47	♈	79	25	N	3
The former star of the following Triangle	15	18	♉	83	5	N	4
That following towards the eouth	19	40	♉	80	38	N	4
That above it	26	44	♈	80	54	N	4
The following star in the other Triangle	6	34	♋	83	4	N	4
The southern thereof	1	28	♋	83	28	N	4
The former and northern star of the Triangle	5	31	♊	84	48	N	4
That in the flexure of the third joynt, or knot	29	44	♌	81	4.	N	3
The neerest to the Pole of the Zodiack	6	26	♌	86	53	N	4
Which follows the 24	28	21	♍	83	18	N	5
Succeeding this	28	22	♍	81	41	N	3
The neerer to the Pole indifferently light	26	51½	♍	84	46	N	3
Preceding the last but three from the extream flexion	7	55	♎	78	32	N	3
The last but two going before the flexion	12	28½	♎	74	11½	N	3
The last but one going before the flexion	29	22	♍	71	4	N	3
The second, which followeth the flexion	29	17	♌	65	18	N	5
Which followeth next after the flexion	2	10½	♍	66	36	N	2
The last star save one of the tail	10	26⅒	♌	61	33	N	3
The last star of the tail	4	37½	♌	57	7	N	3
Between 11 and the arm of *Cepheus : inform.* ✱.	1	4	♈	77	31½	N	5

Denomination of the Stars.	Longitude D	S		Latitude D	′		M
CEPHEUS.							
IN the Girdle	0	13	♉	71	7	N	3
The clear star in the right shoulder	7	13	♈	68	54	N	3
In the left shoulder	27	53½	♈	62	35	N	4
That in the hood towards the North	8	29	♈	61	3	N	4
The southern	7	53½	♈	59	59	N	4
That towards the East	13	39	♈	58	46	N	4
The southern of the two in the bending of the Arm	29	21	♓	71	49	N	4
The northern	29	54	♓	74	0	N	4
That in the shoulders	18	46	♈	65	42	N	5
In the right foot	27	33	♉	75	27	N	4
In the left foot	24	23	♉	64	28	N	3
BOOTES ARCTOPHYLAX.							
THe former of three in the left hand	24	9½	♍	58	53	N	4
The second	25	33	♍	58	51	N	4
The third	26	59½	♍	60	5	N	4
In the left elbow	1	18	♎	54	40	N	4
In the left shoulder	13	5½	♎	49	33½	N	3
In the Head	18	4½	♎	54	15½	N	3
In the right shoulder above the Crown	27	29½	♎	49	1	N	3
Below the right arm in the hip	22	29	♎	40	40	N	3
The lower of the two in the Back	18	16	♎	42	11	N	4
The higher of them	17	17½	♎	42	35	N	4
That in the right leg	27	26½	♎	27	57	N	3
The highest in the left leg	13	42	♎	28	9	N	3
The middle	12	25	♎	26	33	N	4
The lowest	13	37	♎	25	13	N	4
In the skirt of his garment, *Arcturus*	18	39	♎	31	2½	N	1
The lowest of the 3 without form about the right Knee	26	13½	♎	30	27½	N	4
The middle	27	11	♎	31	22	N	4
The highest	27	52	♎	33	52	N	4
The former of the four in the right hand	28	11	♎	40	14	N	5
That following South	29	40	♎	40	31	N	5
The northern	27	53	♎	42	16	N	5
The star following this	29	16	♎	41	55	N	6
The former of the two southern *in colorobo*	29	34½	♎	45	6	N	5
The following	1	26	♎	46	52	N	5
The higher *in colorobo*	27	34	♎	53	27½	N	4
That without form following this	2	36	♍	54	0	N	4
The first of the two without form about the head	11	49	♎	60	40	N	6
The second of them	12	33	♎	60	57	N	6
CORONA BOREA; *The North Crown*							
THe bright star of the Crown	6	38½	♏	44	23	N	2
That going before	3	37	♏	46	8	N	4
The star above this	3	10½	♏	48	25	N	5

That

Denomination of the Stars.	*Longitude* D	′	S	*Latitude* D	′		M
That which followeth to the north	8	2	♏	50	21	N	6
That following the bright ✱	9	14½	♏	44	33	N	4
The next following	11	25	♏	44	52	N	4
The next which doth accompany it	13	32	♏	46	9½	N	4
The last of all	13	2	♏	48	24	N	6

HERCULES.

IN the Head	10	31	♐	37	23	N	3
In the right shoulder	25	27½	♏	42	48	N	3
The last but one of the right Arme	23	36	♏	40	5½	N	3
The lowest in the Arme	20	6½	♏	37	19	N	4
In the left shoulder	9	10	♐	47	47	N	3
In the left Arme	14	22	♐	49	23	N	4
The former in the shin of the Lion	19	36	♐	51	16½	N	4
The following in the △ of the skin	27	19	♐	52	19	N	4
In the Base of the triangle towards the north	23	57	♐	53	46	N	4
The middle of them in the skin	23	38	♐	52	47	N	4
In the left hip	26	2	♏	53	10½	N	3
The more orientall in the left thigh	2	45½	♐	53	21	N	3
The former of the 3 neer together in the thigh	6	21	♐	59	38	N	4
The middlemost	7	19	♐	60	11½	N	4
The following ✱	9	47½	♐	60	13	N	4
In the left Knee	22	56	♐	60	47½	N	3
That in the calfe of the left legge neer the Dragons Head	14	17	♐	69	22	N	3
The former of the 3 obscure stars in the left foot	7	5½	♐	71	20	N	6
The middle of them	11	7	♐	71	13½	N	6
The last	18	0	♐	71	5	N	clo
In the higher right thigh	23	8½	♏	60	22	N	3
The more northern in the same thigh	17	39½	♏	63	14	N	4
In the right Knee	8	43	♏	65	55	N	4
In the higher calfe of the legge	5	57	♏	63	51	N	4
In the legge	2	43	♏	64	23	N	5
The former in the right legge	16	32	♏	62	29	N	4
In the legge of the right foot about the Ankle	2	28½	♏	60	15½	N	4
That almost in the mid-body	27	6	♎	57	15	N	4

The Harp.

THe bright star of the Harp	9	43	♑	61	47	N	1
That above the bright star towards the north	13	14	♑	62	27	N	5
That under the bright star towards the east	12	26	♑	60	26	N	5
That in the middle of the going out of the horns	16	10½	♑	59	26	N	4
The northern of the two stars neer upon touching	24	32½	♑	60	46	N	5
That to the South	25	2	♑	59	41	N	5
The northern of the two preceding in the north yoke	11	16½	♑	56	5	N	3
The little star under this	13	3½	♑	55	16	N	6
The northern of the two following in the yoke	16	11	♑	55	6	N	3
The little star under it	16	20	♑	54	31½	N	6
That almost in the mid-body	20	52	♑	58	6	N	5

Denomination of the Stars.	Longitude D	'	S	Latitude D	'		M

The Swan.

Denomination of the Stars	Longitude D	'	S	Latitude D	'		M
IN the Bill	25	44	♑	49	2	N	3
In the Head	29	20	♑	50	42	N	5
In the middle of the neck	7	33	♒	54	19	N	4
In the breast	19	25	♒	57	9½	N	3
In the tail	29	53½	♒	59	56	N	2
The first and brightest in the bowing of the higher Wing	10	53	♒	64	28	N	3
The southern of the three in the higher Wing	13	21	♒	69	42	N	4
The last but one of the higher Wing	12	39½	♒	71	31	N	4
The extream star of the higher Wing	9	36	♒	73	50½	N	4
That in the bending of the lower Wing	22	9½	♒	49	26	N	3
In the middle thereof	24	18	♒	51	41½	N	4
The extream star of the lower Wing	27	43	♒	43	44	N	3
The former star in the lower foot	0	32	♓	54	59	N	4
That following in the lower Knee	5	21	♓	56	36	N	4
The southern and former of the two neer together in the (higher foot	22	50	♒	63	37	N	4
The higher of them	24	34	♒	64	17	N	4
The lower of the two without form following the right (Wing	3	3	♓	50	33	N	4
The higher of them	4	53	♓	51	31	N	4
Below the Wing towards the foot of *Pegasus*	4	33	♓	38	39	N	4
The former of the two towards the Harp	19	57	♑	66	15	N	4
The more northern following	24	49	♑	68	52	N	4
The little star at the middle of the Wing	28	41	♒	69	35	N	6
Neer the lower Wing	18	14	♒	53	12	N	6
Towards the higher	13	18	♒	69	42	N	6
The new star of the year 1600, in the Breast of the Swan	16	15	♒	55	30	N	

CASSIOPEIA.

Denomination of the Stars	Longitude D	'	S	Latitude D	'		M
IN the Head	29	35	♈	44	40	N	4
In the Breast, *Schedir*	2	17½	♉	46	35	N	3
In the Girdle	4	38½	♉	47	5	N	4
In the bowing towards the Hips	8	27½	♉	48	46	N	3
At the Knee	12	21	♉	46	22	N	3
In the Leg	19	13½	♉	47	29	N	3
The extream star of the foot	26	39	♉	48	54	N	4
In the left Arm	6	14½	♉	43	6½	N	4
In the left Elbow	5	16	♉	43	28	N	5
In the right Elbow	24	39	♈	49	24	N	6
In the eduction of the Seat	7	6	♉	52	16	N	4
The bright star of the Chair	29	35½	♈	51	14	N	3
The extream star of the Chair	25	34	♈	51	8	N	6
Which is by this towards the extremity of the cell	25	32	♈	52	39	N	6
That almost in a right line with the 11 and 17	19	28	♉	52	48	N	6
The end of the foot-stool	22	21	♉	56	13	N	6
The middle of the foot-stool	22	23	♈	54	27	N	6
In the foot-stool next to the Plant of the foot	21	58	♉	52	8	N	6
That which followeth the Knee	12	57	♉	44	57	N	6
That going before the Knee	10	0	♉	45	4	N	6
The Navell ring	6	52	♉	47	31	N	6

The

Denomination of the Stars.	Longitude D	'	S	Latitude D	'		M
The little star in the lair	29	10	♈	45	38	N	6
The northern of the two following in the Rod	29	32	♈	41	15	N	6
The former of them	27	57	♈	43	25	N	6
The last but one of the Rod	26	56	♈	39	15½	N	6
The end of the Rod	25	54	♈	38	9	N	6
The preceding of the three no. below the foot-stool	1	46	♊	53	16	N	6
The following star north	6	12	♊	53	32	N	6
The southern	0	11	♊	52	4	N	6
Above this to the north	6	45	♊	59	8	N	6
Between *Cassiopeia* and *Erichton*						N	
The first	17	17	♊	35	50	N	6
The second	27	19	♊	35	48	N	6
The third	2	33	♋	34	49	N	6
The fourth	3	0	♋	30	22	N	6
The first of the three towards the north	0	45	♋	44	10	N	6
The second	0	57	♋	45	32	N	6
The third	26	15	♊	45	32	N	6
The first star more north towards the lesser Bear	0	10	♋	54	43	N	6
The second	27	45	♊	56	15	N	6
The third	4	13	♋	56	55	N	6
The fourth	29	58	♊	59	18	N	6
The fifth	7	54	♋	60	47	N	6
The sixth	10	14	♋	62	4	N	6
The seventh	9	37	♋	62	46	N	6
The eighth	20	58	♋	63	17	N	6
The new star of the year 1572	6	54	♉	53	45	N	6

PERSEUS.

In the utmost folding of the right hand	18	31	♉	39	0½	N	6
In the right elbow	23	9½	♉	37	28	N	4
In the right shoulder	24	46	♉	34	30	N	3
In the left shoulder	19	4½	♉	31	34½	N	4
In the crown of the head	21	50	♉	34	26	N	5
In the back	23	33	♉	30	36	N	4
The shining star in the right side	26	17	♉	30	5	N	2
That which follows next below	27	4½	♉	27	59	N	5
The little star following this	28	13½	♉	27	55	N	5
Neer the bowing of the same side	29	15	♉	27	14	N	3
That in the left elbow	22	6	♉	26	4	N	4
The head of *Medusa*, *Algol*	20	37	♉	22	22½	N	3
That under *Algol*	20	31	♉	20	54	N	5
That going before this	19	18	♉	20	33	N	4
That preceding towards the north in the same head	18	20	♉	21	35	N	4
In the right hamme	6	13½	♊	28	22	N	5
That that goeth before the right knee	4	11½	♊	28	50	N	4
That going before the bending of the knee	3	55	♊	26	11	N	4
The middle star in the right knee	5	14	♊	26	39	N	4
That below the right knee	6	0	♊	24	35	N	6
In the plant of the right foot	8	1	♊	18	56	N	5
In the left thigh	28	11	♉	22	6	N	4
In the left knee	0	8	♊	19	4	N	3
In the left leg	29	23½	♉	14	53½	N	5

In

Denomination of the Stars.	Longitude D	′	S	Latitude D	′		M
In the left heel	25	33	♉	12	8	N	4
That followeth the left foot	27	36	♉	11	17	N	4
Without form above the head	26	45	♉	42	26	N	3
That in the higher part of the right thigh	2	32	♊	29	31	N	5
That without form going before the head of *Med.*	16	16	♉	20	53	N	5
That which maketh a streight line with the Pole and the (bright star of *Perseus*	2	18	♊	45	10	N	4
The second of them	4	12	♊	48	7	N	6
The third	4	41	♊	49	27	N	6
The fourth	6	25	♊	53	37	N	6

ERICHTONIUS AURIGA.

THe higher and former of the two stars in the head	23	38	♊	32	15	N	6
The lower, and following star	24	14	♊	30	50	N	4
The glistring star in the left shoulder, the Goat	16	16	♊	22	50½	N	1
The bright star in the right shoulder	25	52	♊	21	27½	N	2
In the right arm	24	28	♊	13	44	N	4
In the left elbow	13	9	♊	20	52	N	4
The former Kid	13	5	♊	18	8½	N	4
The latter Kid	13	49½	♊	18	11½	N	4
In the higher foot	11	4½	♊	10	22	N	4
That above the bright star in the right shoulder	24	25½	♊	27	27	N	5
The northern of the two in the loyns	16	52½	♊	18	34½	N	6
The southern	16	6	♊	16	59	N	5
The star below this towards the West	14	58	♊	15	21½	N	5
That following it	17	9	♊	14	4	N	6
That below the Kids about the Buttocks	12	0	♊	15	3	N	5
The former of the two in the right Arm	22	12	♊	15	42	N	5
The following star	22	24	♊	15	43	N	5
Under this in the right leg	22	34	♊	13	49	N	6
In the left shin-bone	16	39½	♊	11	15	N	5
In the right foot	18	34	♊	8	51	N	5
The former of the two about *Erichton*	10	4½	♊	14	51	N	5
The southern following	10	31	♊	14	2	N	5
The northern without form between *Erichth.* & the feet of ♊	27	47	♊	6	4	N	4
The second	22	58	♊	4	6	N	4
Under this towards the East	23	58	♊	2	26	N	4
The former of these	19	52	♊	2	28	N	4
The last of all	21	55	♊	1	6	N	4

OPHIUCHUS.

IN the Head	16	50	♐	35	57	N	3
In the right shoulder	19	45	♐	28	1	N	3
The lower and following star in the same shoulder	21	5	♐	26	11	N	3
The former in the left shoulder	4	59½	♐	32	55½	N	4
That following in the same shoulder	6	16	♐	31	56	N	4
In the left elbow	0	3	♐	23	39½	N	4
The more northern in the left hand	26	44½	♏	17	19	N	3
The following star more South	27	57	♏	16	30½	N	3
In the right bowing	19	33	♐	15	19	N	4

The

Denomination of the Stars.	*Longitude* D	'	S	*Latitude* D	'		M
The former and more southern in the light hand	24	13	♐	13	47	N	4
That more northern following in the same hand	25	13½	♐	15	20	N	5
In the right Knee	12	24	♐	7	18	N	3
In the left Knee	3	39	♐	11	30	N	3
In the right Shin	14	23	♐	2	12	N	3
The fift of them without form in the milkie way	26	31	♐	33	2	N	4
That above the bright star in the neck of the Serpent	16	48	♏	8	4	N	4
Behind the Hips of *Ophiuchus*	14	49	♐	10	21	N	4
The southern of the two that follow	18	57	♐	26	36½	N	3
The northern	19	48	♐	10	35	N	4
The star above this	18	45	♐	15	18	N	4
That between the left hand and the knee of *Ophiuchus*	0	57	♐	13	19	N	5
That without form about the North shoulder	24	30	♐	27	55	N	4
The middle of them	24	38	♐	26	23	N	4
The southern of the three	24	53	♐	24	50	N	4
The former of the four in the right foot	14	1	♐	2	16	N	4
That followeth	15	42	♐	1	32	N	4
The third	16	23	♐	0	20	N	4
The other following	17	12	♐	0	29	N	5
That which toucheth the Heel	17	36	♐	0	58	N	5
In the right leg	16	50	♐	7	10	N	5
That without the leg	21	45	♐	4	20	N	6
The following star of the two in the hand	0	7	♐	23	34	N	5
In the hip of *Ophiuchus*	15	0	♐	10	18	N	5
The southern star following	19	2	♐	8	5	N	4
In the right hand	20	4	♐	10	40	N	5
The northern	19	5	♐	15	6	N	5

The Serpent of OPHIUCHUS.

THe former in the mouth	11	35	♏	38	12	N	5
That in the mouth	14	24	♏	39	6½	N	3
In the Temples	17	6	♏	35	25	N	3
In the eduction of the neck	14	21	♏	34	27½	N	3
Neer the left eye	15	10	♏	37	28	N	4
That towards the Nostrils	16	32	♏	42	37	N	4
The second in the Neck below the Head	12	46½	♏	28	58	N	3
In the middle of the neck	16	30	♏	25	35	N	2
The southern of the three	18	46	♏	24	5	N	3
In the second flexion	20	26½	♏	16	26	N	4
The last of the tail but two	24	34	♐	19	57	N	3
The last but one	0	12	♑	20	37	N	3
The last	10	10	♑	26	59	N	3

The Arrow; or Dart.

THe higher and more eastern	1	32	♒	39	15	N	4
The middle star going before this	27	55	♑	38	58½	N	5
The small star above the last	28	31	♑	36	31	N	6
The higher of the two in *Glyphide*	25	30½	♑	38	53	N	4
The lower of the same	25	39	♑	38	16	N	4
The lower without form above the Arrow	0	13	♒	42	43	N	4

The

Denomination of the Stars.	Longitude D	′	S	Latitude D	′		M
The higher of them	1	36	♒	44	2	N	4
The third of the informed in *Oxygonio*	23	57	♑	46	3	N	4

The Eagle; or flying Vulture.

THe star in the Head	29	28½	♑	27	8½	N	6
In the neck	26	53	♑	26	49½	N	3
The bright star neer the shoulders	26	9	♑	29	21½	N	2
The little star above the bright star	25	33	♑	30	54	N	6
That in the left shoulder	25	26	♑	31	18	N	3
The little star that followeth	26	8½	♑	31	59	N	5
The higher star that goeth before in the lower Wing	21	16½	♑	28	46	N	4
The lower star that followeth in the Wing	22	14	♑	26	35	N	5
The tail of the Vulture	14	15	♑	36	16	N	3
That without form going next before the tail	12	44	♑	37	40	N	3
The middlemost of those without form above that tail	9	12	♑	43	32½	N	4
The seven without form, which followeth of the three	9	17	♑	41	5	N	4

ANTINOUS.

IN the left hand	29	21½	♑	18	48	N	3
In the right side	20	17½	♑	20	14½	N	3
In the Knee	19	17	♑	14	28	N	3
In the right arm	18	1	♑	24	56	N	3
In the Brest	24	50	♑	21	38	N	3
In the right foot	11	46	♑	17	41	N	3
That without form going before this	10	29	♑	16	57	N	4

The Dolphin.

THe bright star of the tail	8	32	♒	29	8	N	3
That which followeth the tail	9	48	♒	28	52½	N	6
That below the tail	9	42	♒	27	34	N	6
The more Southern star of the former side in the *Rhombos*	10	56	♒	31	57½	N	3
The more northern of the same side	11	50½	♒	33	5	N	3
The more southern of the following side	13	36½	♒	32	0	N	3
In the Head	13	52	♒	32	47	N	3
Which goes before in the former side of the four	10	17	♒	32	8½	N	5
The former and lowest of the two in the *Rhombos*	9	18	♒	30	41	N	6
The star following of them	10	42	♒	31	41	N	6

The Horse-Colt.

THe former star of the Head	17	32½	♒	20	12	N	4
The following star of the Head	19	54½	♒	21	6	N	4
The former star of the Mouth	17	54	♒	25	16	N	4
That following	18	54½	♒	24	52	N	4

Pe-

PEGASUS; *Or the Winged-Horse.*

Denomination of the Stars.	*Longitude* D	′	S	*Latitude* D	′		M
THe mouth of *Pegasus*	26	22	♒	22	7½	N	3
The Head	1	15½	♓	16	25	N	4
That in the Head towards the South	29	45½	♒	15	43½	N	5
The lower and following in the Main	13	0	♓	14	30	N	6
The higher preceding in the Main	12	44	♓	15	43	N	6
The bright star of the Neck	10	39½	♓	17	41	N	3
The following star in the Neck	12	25	♓	18	29	N	5
The left Leg	3	23	♓	36	42½	N	4
The left Knee	8	50	♓	34	19	N	4
The right Leg	14	3	♓	41	8½	N	4
The former of the two in the Breast	17	29½	♓	28	49	N	4
That following	18	53½	♓	29	24½	N	4
The right Knee	20	10	♓	35	7½	N	3
In the same Knee towards the south	19	25	♓	34	24	N	5
The former of the two in the Wing	25	33	♓	25	35	N	6
The more southern star following in the Wing	27	6	♓	24	50	N	6
The first star of the Wing: *Marchab.*	17	56½	♓	19	26	N	2
In the putting forth of the thigh, *Scheat*	23	49	♓	31	7	N	2
The end of the Wing	3	38	♓	12	35	N	2
In the Neck of *Pegasus*	6	28	♓	20	51	N	4
Below the mouth and above the foot	24	51	♒	33	21	N	4
That above the same	28	47	♒	36	11	N	4
Following the first	15	15	♓	23	16	N	4

ANDROMEDA.

Denomination of the Stars.	*Longitude* D	′	S	*Latitude* D	′		M
THe Head	8	47	♈	25	42	N	2
The lowest in the right shoulder	17	6½	♈	27	6½	N	5
The lower in the left shoulder	15	25	♈	23	3½	N	4
The more southern of the three in the right Arm	14	58	♈	31	33	N	5
The northern	15	45½	♈	33	20½	N	4
The middlemost	16	7	♈	32	14½	N	5
The more southern in the higher hand	10	28	♈	40	56	N	4
The more northern	11	46	♈	41	44	N	4
The obscure star there	14	23	♈	42	8	N	5
The highest of all in the north hand	12	47	♈	43	49	N	4
The former and higher of the two in the left arm	15	9	♈	17	48	N	4
In the left Elbow	16	53½	♈	15	58	N	5
The more southern in the Girdle	24	49	♈	25	59	N	2
The middlemost	24	6	♈	30	33½	N	4
The northern	23	36	♈	32	30½	N	4
The bright star in the south Foot	8	39	♉	27	46½	N	2
The extream star in the higher Foot	9	6½	♉	36	49	N	5
The brighter star preceding in the right Foot	6	52	♉	35	21½	N	4
The highest in the left Calf	5	16	♉	28	59	N	5
The lower	3	23	♉	27	54½	N	5
At the right Knee	0	56	♉	36	20	N	5
That in the extream Ring of the Chain	24	0	♓	57	19	N	4
The brighter star above in the left shoulder	16	19½	♈	24	20	N	3

The Triangle.

Denomination of the Stars.	Longitude D ′ S	Latitude D ′	M
In the top of the Triangle	1 19 ♉	16 49½ N	4
In the Base towards the North	6 49½ ♉	20 33 N	4
The middlemost	7 59 ♉	19 29 N	5
The more Southern in the Base	7 58 ♉	18 57 N	4

COMA BERENICES.

Denomination of the Stars.	Longitude D ′ S	Latitude D ′	M
In the *Cuspis* of first and North Triangle	18 17 ♍	28 25 N	3
The higher touching this towards the South	18 42 ♍	27 23 N	5
The lower of them	18 46 ♍	27 20 N	4
That which followeth them	19 19 ♍	27 7 N	4
The former of the 2 Southern stars neer together	18 25 ♍	25 51 N	4
The other towards the East	18 48 ♍	26 7 N	4
The first towards the South	18 00 ♍	23 30 N	4
The highest of the 3 stars following that seeme to touch	21 10 ♍	25 16 N	4
The other going before	20 51 ♍	24 56 N	4
The lowest and following star	22 52 ♍	24 00 N	4
The last in the extension of the Haire	28 58 ♍	32 46 N	4
That preceding	27 49 ♍	31 42 N	4
That in the *Cuspe*, between this and the first	27 17 ♍	30 16 N	4
That towards the south of the *Cuspe* of the little △	28 15 ♍	28 32 N	5

The third part of the Catalogue, conteining the Southern Images of the fixed Stars.

The Whale.

Denomination of the Stars.	Longitude D ′ S	Latitude D ′	M
THe star in the snout	9 31 ♉	7 50 S	
The bright star in the jaw of the Whale	8 47 ♉	12 37 S	
The middlemost in the mouth	3 53½ ♉	12 2½ S	3
The former of the 3 neer the eye-lid	2 2 ♉	14 32 S	3
That below the eye	1 54 ♉	5 52 S	4
That above the eye	6 7 ♉	5 36 S	4
In the hinder part of the head	28 29½ ♈	4 19 S	4
The former star North in the breast of □	24 9 ♈	25 17 S	4
The former of the 2 lower stars towards the south	24 32½ ♈	28 31 S	4
The southern of the following star in the breast	28 11½ ♈	28 16½ S	4
The northern preceding	27 47½ ♈	25 58 S	3
In the mid-belly	12 25 ♈	25 1 S	4
The lowest in the Belly	13 50 ♈	31 4 S	4
The northern star of the Belly	16 25 ♈	20 19 S	3
The eastern of the 2 bright stars in the back	10 42½ ♈	15 46 S	3
The more Western of them	6 11½ ♈	16 55 S	3
The North star of the taile	25 23 ♓	10 1 S	3
The southern, or bright star of the taile	26 56 ♓	20 47 S	2

That

Denomination of the Stars.	Longitude D	'	S	Latitude D	'		M
That without form following the bright * of the jaw *ad ortũ*	12	45	♉	14	30	S	5
That goes before the nor. * of the belly toward the South	15	4½	♈	21	55	S	5
That in a right line with the 3 and 5 of the Goat	2	49½	♉	9	12	S	4

ORION.

THe higher of the three joyn'd together in the Head	18	11½	♊	13	26	S	4
The more Western	18	6½	♊	13	54	S	5
The third towards the East	18	33½	♊	14	4½	S	5
The bright shoulder or following star	23	12	♊	16	6	S	2
The left or preceding shoulder	15	23	♊	16	53	S	2
The following star in the left shoulder	16	47	♊	17	22	S	5
That in the right arm	25	4½	♊	14	51	S	4
In the right fathome	28	30½	♊	11	30	S	6
The more southern in the right hand	27	23½	♊	9	15	S	4
That goeth before towards the right hand	26	21	♊	8	44	S	4
Next to the highest in the right hand	27	22	♊	7	20½	S	6
The highest and last of them in the hand	28	8½	♊	7	19	S	6
The former of the two in *Colorobo*	23	9	♊	3	12½	S	5
The following star of them	25	21½	♊	3	21	S	5
That below the right shoulder towards the West	18	56½	♊	19	17	S	5
The following of the two obscure stars in the Back	17	40	♊	19	36	S	5
The former of them	16	46	♊	19	52½	S	6
The former of the four in the Back	15	34	♊	20	8½	S	6
The most northern of the 9 in the Buckler	7	53	♊	8	17	S	5
The second	8	48	♊	9	7	S	4
The third	8	10	♊	11	6	S	6
The fourth	8	0	♊	12	25½	S	4
The fifth	6	49	♊	13	3½	S	4
The sixth	6	23	♊	15	27	S	4
The seventh	6	33	♊	16	50	S	4
The eighth	6	58	♊	20	2	S	4
The last	7	57	♊	20	55	S	4
The first star of the Belt	16	50	♊	23	38	S	2
The middlemost	17	54	♊	24	33½	S	2
The last	19	6½	♊	21	21½	S	2
That in the hilt of the sword	14	37½	♊	25	36	S	3
The highest of the three in the sword	17	28	♊	28	9½	S	5
The middle star of the sword	17	24	♊	28	45	S	3
The southern	17	27	♊	29	17	S	3
The former of the two below the sword	16	20	♊	30	37½	S	4
The following of them	18	23	♊	30	38	S	5
The bright star in the left foot, *Rigel.*	11	17	♊	31	11	S	1
That in the left heel	12	15½	♊	29	53	S	4
That in the calf of the left foot	14	2	♊	31	0	S	5
In the right knee	20	49	♊	33	8	S	3
That going before the last star of the Belt to the South	18	39	♊	26	0½	S	4
That on the Back going before this	14	34½	♊	19	40	S	5
The following of the two above the Belt	14	45	♊	24	6	S	6
The former	13	59	♊	23	32	S	5
Above this on the right side	14	57	♊	21	23	S	5
The former under the Arm and Buckler	11	58	♊	20	8	S	4
The former of the two in the left side	19	45	♊	21	58	S	5

Denomination of the Stars.	*Longitude* D	'	S	*Latitude* D	'		M
The following star	22	25½	♊	21	39	S	5
The following star without form	24	10	♊	22	57	S	5
The higher of the three in the left hand	13	36½	♊	11	45	S	6
The middlemost	11	33½	♊	13	8	S	6
The southern	11	0	♊	14	24	S	6
The former of the ten without form above *Orion*	28	44	♊	29	31	S	4
The following star	2	43	♋	29	49	S	4
Above this	2	22	♋	28	4	S	5
The former of the three in a right line	1	8	♋	18	47	S	4
The middlemost	2	58	♋	15	56½	S	4
The northern	4	50	♋	13	15	S	4
Below the right line towards the South	2	58	♋	18	24	S	5
Above this towards the East	6	36	♋	14	59	S	5
The former of the two below the little Dog	7	14½	♋	20	33	S	4
That following	14	0	♋	22	47	S	4

ERIDANUS; *A River.*

THe ✱ at the left foot of *Orion* in the beginning of the (River	9	40	♊	31	35½	S	4
Above the foot of *Orion* in the River	9	42	♊	27	54½	S	3
The following of the two other stars	7	39	♊	29	52	S	5
That which goeth before	5	29½	♊	27	51	S	4
The following of the two higher stars	3	45½	♊	25	34	S	4
The former of them	1	14½	♊	25	11½	S	4
The follower of them after a little space	18	18	♉	33	13	S	3
That goeth before this	15	22	♉	28	46½	S	4
The third star going before	15	7½	♉	27	47	S	3
That going formost of the four	12	45	♉	24	34	S	3
The first of those that touch the Whale	3	10	♉	24	34	S	3
Between this and the third	5	36	♉	23	58½	S	4
The third which followeth	8	16	♉	25	59	S	3
The inferior going before	23	49	♉	30	25	S	5
That above the same	23	53	♉	27	32	S	4
The following star	24	58	♉	28	9½	S	4
The higher star east	27	46	♉	25	3	S	5
The former of the two between *Erid.* and the Bull	16	25	♉	18	26	S	4
The following star south	20	7	♉	22	45	S	4

LEPUS; *The Hare.*

THe higher star in the former Ear	10	14½	♊	34	34	S	5
The lower star in the same Ear	10	20½	♊	35	54	S	4
The higher star of the following Ear	12	27	♊	35	18	S	6
The lower star of the same Ear	12	14	♊	36	14	S	5
That in the Head	9	49	♊	39	4	S	5
The extream star of the forefeet	6	25½	♊	45	0	S	4
That in the back or mid-body	15	49½	♊	41	5½	S	3
In the left Arm	14	6½	♊	43	57	S	[illegible]
The more southern of the two in the hinder feet	19	21½	♊	45	49½	S	3
The more northern of them	21	36	♊	44	18	S	3
The former in the Back	20	26	♊	38	16	S	4
The hindermost in the Back	23	27½	♊	37	40½	S	4
The last in the tail	26	22	♊	38	26	S	4

The

The greater Dog.

Denomination of the Stars.	Longitude D	′	S	Latitude D	′		M
THe most glittering star in the mouth cal'd *Sirius*	8	35½	♋	39	30	S	1
That in the forehead neer the right Ear	19	1⅓	♋	34	50	S	4
In the mid-forehead	11	27	♋	36	43	S	5
That under the left Ear	14	6	♋	38	2½	S	3
In the Neck	12	3	♋	39	30	S	4
In the right shoulder of the fore-feet	6	32½	♋	42	12	S	5
That in the end of the forefoot	1	42½	♋	41	18½	S	2
That in the Back	15	30½	♋	46	9½	S	5
In the Breast, *viz.* the middlemost	12	36½	♋	46	39⅔	S	5
That in the Belly	17	55	♋	48	30	S	3
In the Belly between the hinder thighs	15	21½	♋	51	24⅓	S	3
The lower of the former star of the right foot	1	7	♋	51	46⅓	S	3
That in the tail	24	11½	♋	51	24½	S	3

PROCYON; The lesser Dog.

IN the Neck	16	39⅓	♋	13	33½	S	3
In the thigh, *Procyon*	20	18⅓	♋	15	57	S	2
Above the bright star of the neck	16	49	♋	12	51	S	6
That out of form above this	16	42½	♋	9	46	S	6
That following towards the tail of Cancer	20	57½	♋	10	19½	S	5

ARGO; The Ship.

THat in the top of the stern	5	53⅓	♌	43	18	S	3
The highest star of the ship	0	35½	♌	44	58⅔	S	3
The former star of the Buckler	28	6	♋	47	28	S	3
In the saile	4	6½	♌	32	7	S	4
That out of form towards the south	4	27	♌	38	31	S	4
The lower of the 3 in the mast	12	26½	♌	32	56	S	6
Above this	12	51⅓	♌	30	18	S	4
That above	10	1⅓	♌	24	29½	S	4
The former of the 2 in the sail-yards	29	26	♌	21	39½	S	4
That following	4	20⅓	♍	22	29¼	S	3
That out of form between the saile and milkie way	23	44	♍	30	30	S	3

HYDRA; Or the Water Serpent.

THe former star in the head	5	39½	♌	14	37	S	5
Above the first towards the north	6	46	♌	14	16½	S	4
The more northern in the hinder part of the head	6	48	♌	11	8	S	4
That goeth before the third towards the south	7	22½	♌	11	36	S	5
The more eastern of all the stars in the head	9	0½	♌	11	1	S	4
That which goeth before in the neck	11	51½	♌	11	5½	S	6
The following star in the eduction of the neck	14	41⅓	♌	13	5	S	4
The middle star of the neck and former of the 3	20	11	♌	15	0	S	5
The northern of the 3 in the bending of the neck	22	4	♌	14	17½	S	4

The

Denomination of the Stars.	*Longitude* D ʹ S	*Latitude* D ʹ	M
The southern in the joynt	19 53½ ♌	16 46 S	5
The bright star call'd the Heart of *Hydra*	21 45½ ♌	22 24 S	1
That following next the heart	27 12 ♌	26 23½ S	4
That following after this	0 9 ♍	26 12 S	5
The former of the two that touch above this	2 48 ♍	23 13 S	5
The following star of them	3 53 ♍	21 51 S	4
The fift star from the Heart	9 31 ♍	24 38 S	4
That in a right line with this and the following star	12 41 ♍	23 31 S	5
The former next the water-Pot	14 51 ♍	21 48½ S	4
Out of form next before the Head	4 45½ ♌	12 27 S	4
Under the Base of the north water-Pot	23 1½ ♍	25 36 S	4
The southern	23 49 ♍	30 17 S	5
Under the tail	21 24 ♎	13 43 S	5
The little star going before this	19 24 ♎	14 37 S	6
That out of form before the head of *Hydra*	28 44 ♋	10 19 S	3

CRATER; *Or the Water-Pot.*

THat in the Base of the Water-Pot	18 13 ♍	22 41 S	4
The following of the two in the middle	53 43 ♍	19 39 S	4
The former of them	21 10½ ♍	17 25 S	4
The former of the two above the Water-Pot	20 27 ♍	13 10 S	4
The following star of them	23 2 ♍	11 17 S	4
The former of the two lower stars	28 30 ♍	18 10 S	4
That following after	0 33 ♎	16 2 S	4
In the middle Water-Pot	24 55 ♍	14 9 S	5

The Raven.

THat neer the eye	6 8 ♎	19 39 S	4
The former of the two higher in the □	5 13 ♎	14 25 S	3
The following star	7 55 ♎	12 7 S	3
The following of the lower star in the □	11 49 ♎	17 59 S	3
In the Bill	6 38 ♎	21 46 S	4
In the Neck	8 14 ♎	18 14 S	5
In the left Wing above the bright star	8 21½ ♎	11 28 S	5

CENTAURUS.

THe most southern of the four in the Head	1 27 ♏	21 49 S	5
That more towards the north	0 59 ♏	19 8 S	5
The former of the two intermediate stars	0 12 ♏	20 51 S	5
The former and remainder of the four	1 3 ♏	20 12 S	5

The End of the Catalogue of TYCHO BRAHE.

Some Vses of the following Tables of *Logarithmes*, *Sines*, and *Tangents*.

AMongst the many admirable ways, that have been from time to time invented, for propagating the Arts Mathematicall, (and especially *Trigonometry*) that of *Logarithmes*, (invented by the right honourable the Lord *Nepeir*, Baron of *Marchiston*) may chalenge the priority, and the Tables of *Artificiall Sines* and *Tangents*, composed by Mr. *Edmund Gunter*, Professor of *Astronomy* in *Gresham* Colledge *London*, for that they expedite the Arithmeticall Work in most Questions, Multiplication being performed by Addition, and Division by Substraction, the *Square Root* extracted by *Bypartion*, and the *Cubique Root* by *Tripartion*, so that by help of these Numbers, and the aforesaid *Sines* and *Tangents*, more may be performed in the space of one hour, then by the Naturall Numbers, or Vulgar Arithmetick can be in six. Now of what frequent use the Doctrine of *Triangles*, both plain and Sphericall is in *Astronomie*, (for the resolution of which the Tables following chiefly serve) let the precedieg Work testifie, and therefore I think it not amisse here in this place, to insert some few familiar Propositions, to shew the use of the Canon and Tables of *Sines* and *Tangents* following.

Byptiion sig
a [illegible] into 2
Tription sig
a dividing by 3

PROP. I.

How to finde the Logarithme *of any number under 1000.*

EVery page in the Table of *Logarithmes* is divided into 11 Columns, in the first of which Columns (having the letter N at the head thereof) are all numbers successively continued from 1 to 1000, so that to finde the *Logarithme* of any number, is no more but to finde the Number in the first Columne, and in the second Columne you shall have the *Logarithme* answering thereunto.

Example. Let the number given be 325 and it is required to finde the *Logarithme* thereof, in the Table of Logarithmes in the first Columne thereof (under the letter N) I finde the number 325, and right against it in the next Columne I finde 511883 which is the Logarithme of 325. In the same manner may you finde the Logarithme of any number under 1000 As the Logarithme of 408 is 610660, and the Logarithme of 800 is 903089, &c.

But here is to be noted, that before every Logarithme must be placed his proper Characteristik: *viz.* If the Number consist but of one figure (as all numbers under 10,) then the Characteristik is 0: If the Number consist of two figures, (as do all numbers between 10 and 100,) then the Characteristik is 1: If the Number consist of three figures (as all numbers between 100 and 1000,) then the Characteristik is 2: If the Number consist of four figures, (as all between 1000 and 10000,) then the Characteristik must be three. In brief, *The Characteristik of any Logarithme must consist of a Unit lesse then the given Number consisteth of Digits or Places.* And by observing this Rule, the Logarithm of 325 is 2,511883 and the Logarithme of 408, is 2,610660, and the Log. of 800, is 2,903089, &c.

Prop.

Prop. 2.

A Logarithme being given to finde the absolute Number thereunto belonging.

BY the former Observation, the Characteristik will declare, what number of places the absolute number consisteth of.

Example. Let the Logarithme given be 2,143015. Now because the Characteristik is 2, I know the absolute Number consisteth of three places, and therefore may be found in the second Column of the Table of Logarithmes (having O at the top thereof) against which I finde 139, which is the absolute Number answering to the Logarithme 2,143015.

Prop. 3.

How to finde the Logarithme of a Number that consisteth of four places.

YOu must finde the three first figures of the given Number in the first Column, as before, and seek the last figure thereof amongst the great figures in the head of the page, and in the common Area, or meeting of these two lines is the Logarithme you desire, if before it, you prefixe its proper Characteristik.

Example.

Let it be required to finde the Logarithme of 5628, I finde 562 (the three first figures) in the first Column, and 8 (the last figure) in the head of the Table) then going down from 8 (in the head of the Table) till I come against 562 (in the first Column) there I finde 750354, before which I place three for the Characteristik, which is 3,750354, and that is the Logarithme sought for.

Prop. 4.

Any Number of Degrees and Minutes being given, to finde the Artificiall Sine *and* Tangent *thereof.*

SUppose it were required to finde the *Sine* and *Tangent* of 18 deg. 20 min. I turn to the Table of *Sines*, and in the head thereof I finde *Degrees* 18, then in the first Column (under M) I finde 20′, and right against it is 9,497682 for the *Sine*, and 9,520305 for the *Tangent* of 18d 20′.

If any Sine *and* Tangent *be given, it is easie to finde what Degrees and Minutes answer thereunto.*

As suppose, 9,525275, were a *Sine* given, I look for this Number in the Table of *Sines*, and I finde it to stand against 19d 35′, and therefore is the *Sine* thereof: The same must be done for *Tangents*.

And here note, that if you finde the Degrees in the head of the Table, you must finde the Minutes in the first Column towards the left hand, as in the example, but if you finde the Degrees in the bottome of the Table, then you must finde the Minutes in the last Column towards the right hand. For all Arches under 45 degrees, are found in the head, and all above 45 degrees are found at the foot of the Table.

And take this for a generall rule
that in all propositions & questions whatsoever Chiliades
wrought by sines tangents & logarithms you must add
the 2 & 3 numbers together & from the sum substract the 1
first number & the remainder is the answer. multiplication
being performed by addition & division by substraction
see Leybourns compleat surveyor page 74

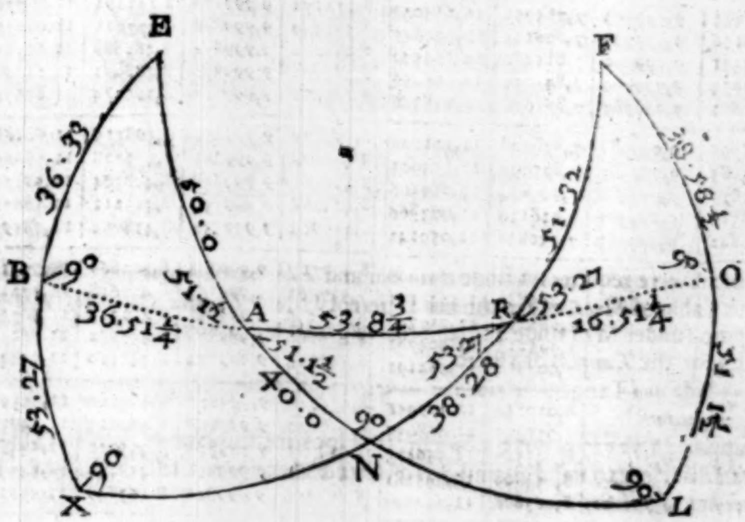
CANON TRIANGULORUM *LOGARITHMICUS.*

OR,

A TABLE of Artificiall *Sines* and *Tangents*, to every Degree and Minute of the *Quadrant.*

The common Radius being 10,000000.

By VINCENT WING. *Philomathemat.*



Ex Angulis Latera vel ex Lateribus Angulos & mixtim, in Triangulis tam planis quàm Sphæricis, assequi, summa gloria Mathematici est: Sic enim Cœlum, & Terras & Maria fælici & admirando calculo mensurat. Fran. Vieta.

LONDON:
Printed by ROBERT LEYBOURN, for the Company of STATIONERS, 1651.

Nn

	Degree 0.				Degree 1				
M	Sine	*Co-sine.*	Tanget.	*Co-tang.*	Sine	*Co-sine*	Tanget.	*Co-tang.*	'
0	0,000000	10,000000	0,000000	*Infinita*	8,241855	9,999934	8,241921	11,758079	60
1	6,463726	9,999999	6,463726	13,536274	8,249033	9,999932	8,249102	11,750898	59
2	6,764756	9,999999	6,764756	13,235244	8,256094	9,999929	8,256165	11,743835	58
3	6,940847	9,999999	6,940847	13,059153	8,263042	9,999927	8,263115	11,736885	57
4	7,065786	9,999999	7,065786	12,934214	8,269881	9,999925	8,269956	11,730044	56
5	7,162696	9,999999	7,162696	12,837304	8,276614	9,999922	8,276691	11,723309	55
6	7,241877	9,999999	7,241878	12,758122	8,283243	9,999920	8,283323	11,716677	54
7	7,308824	9,999999	7,308825	12,691175	8,289773	9,999918	8,289856	11,716144	53
8	7,366816	9,999999	7,366817	12,633183	8,296207	9,999915	8,296292	11,703708	52
9	7,417968	9,999999	7,417970	12,582030	8,302546	9,999913	8,302634	11,697366	51
10	7,463726	9 999998	7,463727	12,536273	8,308794	9,999910	8,308884	11,691116	50
11	7,505118	9,999998	7,505120	12,494880	8,314954	9,999907	8,315046	11,684954	49
12	7,542906	9,999997	7,542909	12,457091	8,321027	9,999905	8 321122	11,678878	48
13	7,577668	9,999997	7,577272	12,422328	8,327016	9,999902	8,327114	11,672886	47
14	7,509853	9,999996	7,609857	12,390143	8,332924	9,999899	8,333025	11,666975	46
15	7,639816	9,999996	7,639826	12,360180	8,338753	9,999897	8,338856	11,661144	45
16	7,667844	9,999995	7,667849	12,332151	8,344504	9 999894	8,344610	11,655390	44
17	7,694173	9,999995	7,694179	12,305821	8 350180	9,999891	8,350289	11,649711	43
18	7,718977	9,999994	7,719003	12,281997	8,355783	9,999888	8,355895	11,644105	42
19	7,742477	9,999993	7,742484	12,257516	8,361315	9 999885	8,361430	11,638570	41
20	7,764754	9,999993	7,764761	12,235239	8,366777	9,999882	8,366895	11,633105	40
21	7,785943	9,999992	7,785951	12,214049	8,372171	9 999879	8,372292	11,627708	39
22	7,806146	9,999991	7,806145	12,193845	8 377499	9,999876	8,377622	11,622378	38
23	7,825451	9,999990	7 825460	12,174540	8,382762	9,999873	8,382889	11,617111	37
24	7,843934	9,999989	7,84 944	12,156056	8,387962	9,999870	8,388092	11,611908	36
25	7,861662	9,999989	7,861674	12,138326	8,393101	9,999867	8,393234	11,606766	35
26	7,878695	9,999988	7,878708	12,121292	8,398179	9 999864	8,398315	11,601685	34
27	7,895085	9,999987	7,895099	12,104901	8 403199	9,999861	8,403338	11,596662	33
28	7,910879	9,999986	7,910894	12,089106	8,408161	9 999858	8,408304	11,591696	32
29	7,926119	9,999985	7,926134	12,073866	8,413068	9 999854	8,413213	11,586787	31
30	7,940842	9,999983	7,940858	12,059142	8,417919	9,999851	8,418068	11,581932	30
31	7,955082	9,999982	7,955100	12,044900	8 422717	9,999848	8,422869	11,577131	29
32	7,968870	9,999981	7 968889	12,031111	8,427462	9,999844	8 427618	11,572382	28
33	7,982233	9,999980	7,982253	12,017747	8,432156	9,999841	8,432315	11,567685	27
34	7,995198	9 999978	7,995215	12,004781	8,436800	9,999838	8,436962	11 563038	26
35	8,007787	9,999978	7,007810	11,992191	8,441354	9,999834	8,441560	11,558440	25
36	8,020021	9,999976	8,020044	11,979956	8,445941	9,999831	8 446110	11,553990	24
37	8,031919	9,999975	8,031945	21 968055	8,450440	9,999827	8 450613	11,549387	23
38	8,043501	9,999973	8,043527	11,956473	8,454893	9 999824	8,455070	11,544930	22
39	8,054781	9,999972	8,054809	11,945181	8 459301	9 999820	8,459481	11,540519	21
40	8,065776	9,999971	8,065806	11,934194	8.463665	9 999816	8 463849	11,536151	20
41	8,076500	9 999969	8,076531	11,923469	8.467985	9,999812	8,468172	11,531828	19
42	8,086965	9,999968	8,086997	11,913003	8,472263	9,999809	8,472454	11,527546	18
43	8,09[illegible]	9,999966	8,097217	11,902783	8,476498	9,999805	8,476693	11,523307	17
44	8 107167	9,999964	8,107203	11,892797	8,480693	9,999801	8 480892	11,519108	16
45	8,116926	9,999963	8,116963	11,883037	8,484848	9,999797	8,485050	11,514950	15
46	8,126471	9 999961	8,126510	11,873490	8,488963	9,999794	8,489170	11,510830	14
47	8,135810	9,999959	8,135851	11,864149	8,493040	9,999790	8,493250	11,506750	13
48	8,144953	9,999958	8,144996	11,855004	8,497078	9,999786	8,497293	11,502707	12
49	8,153907	9,999956	8 153952	11,846048	8,501080	9,999782	8,501298	11,498702	11
50	8,162681	9,999954	8,162727	11,837273	8,505046	9,999778	8,505267	11 494733	10
51	8,171280	9,999952	8,171328	11,828672	8,508974	9 999774	8,509200	11,490800	9
52	8,179713	9,999950	8,179763	11,820237	8,512867	9,999769	8,513098	11,486902	8
53	8,187985	9,999948	8,188036	11,811964	8,516726	9 999765	8,516961	11,483039	7
54	8,196102	9,999946	8,196156	11,803844	8,520551	9,999761	8,520790	11,479210	6
55	8,204070	9,999944	8,204126	11 795874	8,524343	9,999756	8,524586	11,475414	5
56	8,211895	9,999942	8,211953	11,788047	8,528102	9,999753	8,528349	11,471651	4
57	8,219581	9,999940	8,219641	11,780359	8,531828	9 999748	8,532080	11,467920	3
58	8,227134	9,999938	8,227195	11,772805	8,535523	9,999744	8,535779	11,464221	2
59	8,234557	9,999936	8,234621	11,765379	8,539186	9,999740	8,539447	11,460553	1
60	8,241855	9,999934	8,241921	11,758079	8,542819	9,999735	8,543084	11,456916	0
	Co-sine	Sine	*Co-tang.*	Tangent.	*Co-sine*	Sine	*Co-tang.*	Tangent.	M
	Degree 89.				Degree 88.				

M	Degree 2. Sine	Co-sine	Tangent.	Co-tang.	Degree 3. Sine	Co-sine	Tangent.	Co-tang.	
0	8,542819	9,999735	8,543084	11,456916	8,718800	9,999404	8,719396	11,280604	60
1	8,546422	9,999731	8,546691	11,453309	8,721204	9,999398	8,721806	11,278194	59
2	8,549995	9,999726	8,550268	11,449732	8,723595	9,999391	8,724254	11,275796	58
3	8,553558	9,999722	8,553817	11,446183	8,725972	9,999384	8,726588	11,273412	57
4	8,557054	9,999717	8,557336	11,442664	8,728336	9,999378	8,728959	11,271041	56
5	8,560540	9,999713	8,560827	11,439172	8,730688	9,999371	8,731317	11,268683	55
6	8,563999	9,999708	8,564291	11,435709	8,733027	9,999364	8,733663	11,266337	54
7	8,567431	9,999703	8,567727	11,432272	8,735354	9,999357	8,735996	11,264004	53
8	8,570836	9,999699	8,571137	11,428863	8,737667	9,999350	8,738317	11,261683	52
9	8,574214	9,999694	8,574520	11,425480	8,739969	9,999343	8,740626	11,259374	51
10	8,577566	9,999689	8,577877	11,422123	8,742259	9,999336	8,742922	11,257078	50
11	8,580892	9,999685	8,581208	11,418792	8,744536	9,999329	8,745207	11,254793	49
12	8,584193	9,999680	8,584514	11,415486	8,746801	9,999322	8,747479	11,252521	48
13	8,587469	9,999675	8,587795	11,412205	8,745955	9,999315	8,749740	11,250240	47
14	8,590721	9,999670	8,591051	11,408949	8,751297	9,999308	8,751989	11,248011	46
15	8,593948	9,999665	8,594283	11,405717	8,753528	9,999301	8,754227	11,245773	45
16	8,597152	9,999660	8,597492	11,402508	8,755747	9,999294	8,756453	11,243547	44
17	8,600332	9,999655	8,600677	11,399323	8,757955	9,999286	8,758668	11,241332	43
18	8,603488	9,999650	8,603838	11,396161	8,760151	9,999279	8,760872	11,239128	42
19	8,606622	9,999645	8,606978	11,393022	8,762337	9,999272	8,763065	11,236935	41
20	8,609734	9,999640	8,610094	11,389906	8,764511	9,999265	8,765246	11,234754	40
21	8,612823	9,999635	8,613189	11,386811	8,766675	9,999257	8,767417	11,232583	39
22	8,615891	9,999629	8,616262	11,383738	8,768828	9,999250	8,769578	11,230422	38
23	8,618937	9,999624	8,619313	11,380687	8,770970	9,999242	8,771727	11,228273	37
24	8,621967	9,999619	8,622343	11,377657	8,773101	9,999235	8,773866	11,229134	36
25	8,624965	9,999614	8,625352	11,374648	8,775223	9,999227	8,775995	11,224005	35
26	8,627948	9,999608	8,628340	11,371660	8,777333	9,999220	8,778114	11,221886	34
27	8,630911	9,999603	8,631308	11,368692	8,779434	9,999212	8,783222	11,219778	33
28	8,633854	9,999597	8,634456	11,365744	8,781524	9,999204	8,782320	11,217680	32
29	8,636776	9,999592	8,637184	11,362816	8,783605	9,999197	8,784404	11,215592	31
30	8,639679	9,999586	8,640093	11,359907	8,785675	9,999189	8,786486	11,213514	30
31	8,642563	9,999581	8,642982	11,357017	8,787736	9,999181	8,788554	11,211446	29
32	8,645428	9,999575	8,645853	11,354147	8,789787	9,999174	8,790613	11,209387	28
33	8,648274	9,999570	8,648704	11,351296	8,791828	9,999166	8,792662	11,207338	27
34	8,651102	9,999564	8,651538	11,348463	8,793859	9,999158	8,794701	11,205299	26
35	8,653911	9,999558	8,654352	11,345648	8,795881	9,999150	8,796731	11,203269	25
36	8,656702	9,999553	8,657149	11,342851	8,797894	9,999142	8,798752	11,201248	24
37	8,659475	9,999547	8,659928	11,340072	8,799897	9,999134	8,800763	11,199237	23
38	8,662230	9,999541	8,661689	11,337311	8,801891	9,999126	8,802765	11,197235	22
39	8,664968	9,999535	8,665433	11,334567	8,803876	9,999118	8,807458	11,195242	21
40	8,667689	9,999529	8,668160	11,331840	8,805852	9,999110	8,806742	11,193258	20
41	8,670393	9,999523	8,670869	11,329130	8,807819	9,999102	8,808717	11,191283	19
42	8,673080	9,999518	8,673563	11,326437	8,809777	9,999094	8,812683	11,189317	18
43	8,675751	9,999512	8,676239	11,323761	8,811726	9,999086	8,812641	11,187359	17
44	8,678405	9,999506	8,678899	11,321190	8,813667	9,999077	8,814589	11,185411	16
45	8,681043	9,999499	8,641544	01,31[illegible]56	8,815598	9,999069	8,816529	11,183471	15
46	8,683665	9,99949[illegible]	8,684172	11,315828	8,817522	9,999061	8,818461	11,181539	14
47	8,686272	9,999487	8,686784	11,313216	8,819436	9,999052	8,820384	11,179616	13
48	8,688892	9,999481	8,689381	11,310619	8,821342	9,999044	8,822298	11,177702	12
49	8,691438	9,999475	8,691963	11,308037	8,823240	9,999036	8,824205	11,175795	11
50	8,693998	9,999469	8,694529	11,305471	8,825130	9,999027	8,826103	11,173897	10
51	8,696543	9,999462	8,697081	11,302919	8,827011	9,999019	8,827992	11,172008	9
52	8,699073	9,999456	8,699617	11,300383	8,828884	9,999010	8,829874	11,170116	8
53	8,701589	9,999450	8,702139	11,297861	8,830749	9,999002	8,831748	11,168252	7
54	8,704090	9,999443	8,704646	11,295354	8,832106	9,998993	8,833613	11,166387	6
55	8,706576	9,999437	8,7[illegible]7139	11,292860	8,834456	9,998984	8,835471	11,164529	5
56	8,709049	9,999431	8,709618	11,290381	8,836297	9,998976	8,837321	11,162679	4
57	8,711507	9,999424	8,712083	11,287917	8,838130	9,998967	8,839163	11,160837	3
58	8,713952	9,999818	8,714534	11,285466	8,839956	9,998958	8,840998	11,159002	2
59	8,716383	9,999411	8,716972	11,283028	8,841774	9,998940	8,842825	11,157175	1
60	8,718800	9,999404	8,719396	11,280604	8,843585	9,998941	8,844644	11,155356	0
M	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
	Degree 87.				Degree 86.				

	Degree 4.				Degree 5				
M	Sine	Co-sine.	Tanget.	Co-tang.	Sine	Co-sine	Tanget.	Co-tang.	
0	8,843584	9,998941	8,844644	11,155356	8,940296	9,998344	8,941952	11,058048	60
1	8,845387	9,998931	8,846455	11,153545	8,941738	9,998333	8,943404	11,056596	59
2	8,847183	9,998923	8,848240	11,151740	8,943174	9,998322	8,944852	11,055148	58
3	8,848971	9,998914	8,850057	11,149943	8,944606	9,998312	8,946295	11,053705	57
4	8,850751	9,998905	8,851846	11,148154	8,946034	9,998300	8,947734	11,052266	56
5	8,852525	9,998896	8,853628	11,146372	8,957456	9,998289	8,949168	11,050832	55
6	8,854291	9,998887	8,855403	11,144597	8,958814	9,998277	3,950597	11,049403	54
7	8,856049	9,998878	8,857171	11,142829	8,950287	9,998266	8,952021	11,047979	53
8	8,857801	9,998869	8,858932	11,141068	8,951696	9,998255	8,953441	11,046559	52
9	8,859546	9,998860	8,860686	11,139314	8,953099	9,998243	8,954856	11,045144	51
10	8,861283	9,998851	8,862433	11,137567	8,954499	9,998232	8,956267	11,043733	50
11	8,863014	9,998841	8,864173	11,135827	8,955894	9,998220	8,957674	11,042326	49
12	8,864738	9,998832	8,865906	11,134094	8,957284	9,998209	8,959075	11,040925	48
13	8,866454	9,998823	8,867632	11,132368	8,958670	9,998197	8,960473	11,039527	47
14	8,868165	9,998813	8,869351	11,130649	8,960052	9,998186	8,961866	11,038134	46
15	8,869868	9,998804	8,871064	11,128936	8,961429	9,998174	8,963254	11,036746	45
16	8,871565	9,998795	8,872750	11,127230	8,962801	9,998163	8,964639	11,035361	44
17	8,873255	9,998785	8,874469	11,125531	8,964170	9,998151	8,966019	11,033981	43
18	8,874938	9,998776	8,876162	11,123838	8,965534	9,998139	8,967394	11,032606	42
19	8,876615	9,998766	8,877849	11,122151	8,966893	9,998128	8,968766	11,031234	41
20	8,878285	9,998757	8,879529	11,120471	8,968249	9,998106	8,970133	11,029867	40
21	8,879949	9,998747	8,881202	11,118798	8,969600	9,998104	8,971495	11,028505	39
22	8,881607	9,998738	8,882869	11,117131	8,970947	9,998092	8,972855	11,027145	38
23	8,883258	9,998728	8,884530	11,115470	8,972289	9,998080	8,974209	11,025791	37
24	8,884901	9,998718	8,886185	11,113815	8,973626	9,998068	8,975560	11,024440	36
25	8,886542	9,998708	8,887833	11,112167	8,974962	9,998056	8,976906	11,023094	35
26	8,888174	9,998699	8,889476	11,110524	8,976293	9,998044	8,978248	11,021752	34
27	8,889801	9,998689	8,891112	11,108888	8,977619	9,998032	8,979586	11,020414	33
28	8,891421	9,998679	8,892742	11,107258	8,978941	9,998020	8,980921	11,019079	32
29	8,893035	9,998669	8,894366	11,105634	8,980259	9,998008	8,982251	11,017749	31
30	8,894643	9,998659	8,845984	11,104016	8,981573	9,997996	8,983577	11,016423	30
31	8,896246	9,998649	8,897596	11,102404	8,982883	9,997984	8,984899	11,015101	29
32	8,897842	9,998639	8,899203	11,100797	8,984189	9,997971	8,986217	11,013783	28
33	8,899432	9,998629	8,900803	11,099197	8,985491	9,997959	8,987532	11,012468	27
34	8,901017	9,998619	8,902398	11,097602	8,986789	9,997947	8,988842	11,011158	26
35	8,902596	9,998609	8,903987	11,096013	8,988083	9,997935	8,990149	11,009851	25
36	8,904169	9,998599	8,905570	11,094430	8,989374	9,997922	8,991451	11,008549	24
37	8,905736	9,998589	8,907147	11,092853	8,990660	9,997910	8,992750	11,007250	23
38	8,907297	9,998577	8,908719	11,091281	8,991943	9,997897	8,994045	11,005955	22
39	8,908853	9,998568	8,910285	11,089715	8,993228	9,997885	8,995337	11,004663	21
40	8,910404	9,998558	8,911846	11,088154	8,994497	9,997873	8,996624	11,003376	20
41	8,911949	9,998548	8,913401	11,086599	8,995768	9,997860	8,997908	11,002092	19
42	8,913488	9,998537	8,914951	11,085049	8,997036	9,997847	8,999188	11,000812	18
43	8,915022	9,998527	8,916495	11,083505	8,998299	9,997835	9,000465	10,999535	17
44	8,916550	9,998516	8,918034	11,081966	8,999560	9,997822	9,001738	10,998262	16
45	8,918073	9,998506	8,919568	11,080432	8,000816	9,997809	9,003007	10,996993	15
46	8,919591	9,9984[illegible]	8,921096	11,078904	9,002069	9,997797	9,004272	10,995728	14
47	8,921103	9,998[illegible]85	8,922619	11,077381	9,003318	9,997784	9,005534	10,994466	13
48	8,922610	9,998474	8,924136	11,075864	9,004563	9,997771	9,006792	10,993208	12
49	8,924112	9,998464	8,925649	11,074351	9,005805	9,997758	9,008047	10,991953	11
50	8,925609	9,998453	8,927156	11,072844	9,007044	9,997732	9,009298	10,990702	10
51	8,927100	9,998442	8,928658	11,071342	9,008278	9,997732	9,010546	10,989454	9
52	8,928587	9,998431	8,930155	11,069845	9,009510	9,997719	9,011790	10,988210	8
53	8,930068	9,998421	8,931647	11,068353	9,010737	9,997706	9,013031	10,986969	7
54	8,931[illegible]44	9,998410	8,933134	11,066866	9,011962	9,997693	9,014268	10,985732	6
55	8,933015	9,998399	8,934616	11,065384	9,013182	9,997680	9,015502	10,984498	5
56	8,934481	9,998388	8,936093	11,063907	9,014399	9,997667	9,016732	10,983268	4
57	8,935942	9,998377	8,937565	11,062435	9,015613	9,997654	9,017959	10,982041	3
58	8,937398	9,998366	8,939032	11,060968	9,016824	9,997641	9,019183	10,980817	2
59	8,938850	9,998355	8,940494	11,059506	9,018031	9,997628	9,020403	10,979597	1
60	8,940296	9,998344	8,941952	11,058048	9,019235	9,997614	9,021620	10,978380	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	2angent.	M
	Degree 85.				Degree 84.				

	Degree 6.				Degree 7.				
M	Sine	Co-sine.	Tangent,	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	
0	9,019235	9,997614	9,021620	10,978380	9,085894	9,996751	9,089144	10,910856	60
1	9,020435	9,997601	9,022834	10,977166	9,086922	9,996735	9,090187	10,909813	59
2	9,021632	9,997588	9,024044	10,975956	9,087947	9,996720	9,091228	10,908772	58
3	9,022825	9,997574	9,025251	10,974749	9,088970	9,996704	9,092266	10,907734	57
4	9,024016	9,997561	9,026455	10,973545	9,089990	9,996688	9,093302	10,906698	56
5	9,025203	9,997548	9,027655	10,972345	9,091088	9,996673	9,094336	10,905664	55
6	9,026386	9,997534	9,028852	10,971148	9,092024	9,996657	9,095367	10,904633	54
7	9,027567	9,997520	9,030046	10,969954	9,093037	9,996641	9,096395	10,903604	53
8	9,028744	9,997507	9,031237	10,968763	9,094047	9,996625	9,097422	10,902578	52
9	9,029918	9,997493	9,032425	10,967575	9,095056	9,996610	9,098446	10,901554	51
10	9,031089	9,997480	9,033609	10,966391	9,096062	9,996594	9,099468	10,900532	50
11	9,032257	9,997466	9,034791	10,965209	9,097065	9,996578	9,100487	10,899513	49
12	9,033421	9,997452	9,035969	10,964031	9,098066	9,996562	9,101504	10,898496	48
13	3,034582	9,997439	9,037144	10,962856	9,099065	9,996546	9,102519	10,897481	47
14	9,035741	9,997425	9,038316	10,961684	9,100062	9,996530	9,103532	10,896468	46
15	9,036896	9,997411	9,039485	10,960515	9,101056	9,996514	9,104542	10,895458	45
16	9,038048	9,997397	9,040651	10,959349	9,102048	9,996498	9,105550	10,894450	44
17	9,039197	9,997383	9,041813	10,958187	9,103037	9,996482	9,106556	10,893444	43
18	9,040342	9,997369	9,042973	10,957027	9,104025	9,996465	9,107559	10,892441	42
19	9,041485	9,997355	9,044130	10,955870	9,105010	9,996449	9,108560	10,891440	41
20	9,042625	9,997341	9,045284	10,954716	9,105992	9,996433	9,109559	10,890441	40
21	9,043762	9,997327	9,046434	10,953565	9,106973	9,996417	9,110556	10,889444	39
22	9,044895	9,997313	9,047582	10,952418	9,107951	9,996400	9,111551	10,888449	38
23	9,046026	9,997299	9,048727	10,951273	9,108927	9,996384	9,112543	10,887457	37
24	9,047154	9,997285	9,049869	10,950131	9,109901	9,996368	9,113533	10,886467	36
25	9,048279	9,997271	9,051008	10,948992	9,110873	9,996351	9,114521	10,885478	35
26	9,049400	9,997256	9,052144	10,947856	9,111842	9,996335	9,115507	10,884493	34
27	9,050519	9,997242	9,053277	10,946723	9,112809	9,996318	9,116491	10,883509	33
28	9,051635	9,997228	9,054408	10,945592	9,113774	9,996302	9,117472	10,882528	32
29	9,052749	9,997214	9,055535	10,944465	9,114737	9,996285	9,118452	10,881548	31
30	9,053859	9,997199	9,056640	10,943340	9,115698	9,996269	9,119429	10,880571	30
31	9,054966	9,997185	9,057781	10,942219	9,116656	9,996252	9,120404	10,879596	29
32	9,056071	9,997170	9,058900	10,941100	9,117612	9,996235	9,121377	10,878623	28
33	9,057172	9,997156	9,060016	10,939984	9,118567	9,996218	9,122348	10,877652	27
34	9,058271	9,997141	9,061130	10,938870	9,119519	9,996202	9,123317	10,876683	26
35	9,059367	9,997127	9,092240	10,937760	9,120469	9,996185	9,124284	10,875716	25
36	9,060460	9,997112	9,063348	10,936652	9,121417	9,996168	9,125248	10,874751	24
37	9,061551	9,997098	9,064453	10,935547	9,122362	9,996151	9,126211	10,873789	23
38	9,062638	9,997083	9,065556	10,934444	9,123306	9,996134	9,127172	10,872828	22
39	9,063723	9,997068	9,066655	10,933345	9,124248	9,996117	9,128130	10,871870	21
40	9,064806	9,997053	9,067752	10,932248	9,125187	9,996100	9,129087	10,870913	20
41	9,065885	9,997039	9,068847	10,931153	9,126125	9,996083	9,130041	10,869959	19
42	9,066962	9,997024	9,069938	10,930061	9,127060	9,996066	9,130994	10,869006	18
43	9,068036	9,997009	9,071027	10,928973	9,127993	9,996049	9,131944	10,868056	17
44	9,069107	9,996994	9,072113	10,927887	9,128925	9,996032	9,132893	10,867107	16
45	9,070176	9,996979	9,073197	10,926803	9,129854	9,996015	9,133839	10,866161	15
46	9,071242	9,996964	9,074278	10,925722	9,130781	9,995998	9,134784	10,865216	14
47	9,072306	9,996949	9,075356	10,924644	9,131706	9,995980	9,135726	10,864274	13
48	9,073366	9,996934	9,076432	10,923568	9,132630	9,995963	9,136666	10,863334	12
49	9,074424	9,996919	9,077505	10,922495	9,133551	9,995946	9,137605	10,862395	11
50	9,075480	9,996904	9,078576	10,921424	9,134470	9,995928	9,138542	10,861458	10
51	9,076533	9,996889	9,079644	10,920356	9,135387	9,995911	9,139476	10,860524	9
52	9,077583	9,996874	9,080710	10,919290	9,136303	9,995894	9,140409	10,859591	8
53	9,078631	9,996858	9,081773	10,918227	9,137216	9,995876	9,141340	10,858660	7
54	9,079676	9,996843	9,082833	10,917167	9,138127	9,995859	9,142269	10,857731	6
55	9,080719	9,996828	9,083891	10,916109	9,139037	9,995841	9,143196	10,856804	5
56	9,081759	9,996812	9,084947	10,915053	9,139944	9,995825	9,144121	10,855879	4
57	9,082797	9,996797	9,085999	10,914000	9,140850	9,995806	9,145044	10,854956	3
58	9,083832	9,996782	9,087050	10,912950	9,141754	9,995788	9,145965	10,854035	2
59	9,084864	9,996766	9,088098	10,911902	9,142655	9,995770	9,146885	10,853115	1
60	9,085894	9,996751	9,089144	10,910856	9,142555	9,995753	9,147803	10,852197	0
	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
	Degree 83.				Degree 82.				

	Degree 8.				Degree 9				
M	Sine	Co-sine.	Tanget.	Co-tang.	Sine	Co-sine	Tanget.	Co-tang.	
0	9,143555	9,995753	9,147803	10,852197	9,194332	9,994620	9,199712	10,800287	60
1	9,144453	9,995735	9,148718	10,851282	9,195129	9,994600	9,200529	10,799470	59
2	9,145349	9,995717	9,149632	10,850368	9,195925	9,994580	9,201345	10,798655	58
3	9,146243	9,995699	9,159544	10,849456	9,196718	9,994560	9,202159	10,797841	57
4	9,147136	9,995681	9,151454	10,848546	9,197511	9,994540	9,202971	10,797029	56
5	9,148026	9,995664	9,152363	10,847637	9,198302	9,994519	9,203782	10,796218	55
6	9,148915	9,995646	9,153269	10,846731	9,199091	9,994499	9,204592	10,795408	54
7	9,149801	9,995628	9,154174	10,845825	9,199879	9,994479	9,205400	10,794600	53
8	9,150686	9,995610	9,155077	10,844923	9,200666	9,994459	9,206207	10,793793	52
9	9,151569	9,995591	9,155978	10,844022	9,201451	9,994438	9,207013	10,792987	51
10	9,152451	9,995573	9,156877	10,843123	9,202234	9,994418	9,207817	10,792183	50
11	9,153330	9,995555	9,157775	10,842225	9,203017	9,994398	9,208619	10,791381	49
12	9,154208	9,995537	9,158671	10,841329	9,203797	9,994377	9,209420	10,790580	48
13	9,155082	9,995519	9,159565	10,840435	9,204577	9,994357	9,210220	10,789780	47
14	9,155957	9,995501	9,160457	10,839543	9,205354	9,994336	9,211018	10,788982	46
15	9,156830	9,995482	9,161347	10,838653	9,206131	9,964316	9,211815	10,788185	45
16	9,157700	9,995464	9,162236	10,837764	9,206906	9,994295	9,212611	10,787389	44
17	9,158569	9,995446	9,163123	10,836877	9,267679	9,994274	9,213405	10,786595	43
18	9,159436	9,995427	9,164008	10,835992	9,208452	9,994254	9,214198	10,785802	42
19	9,160301	9,995409	9,164892	10,835108	9,209222	9,994233	9,214989	10,785011	41
20	9,161164	9,995390	9,165773	10,834226	9,209992	9,994212	9,215780	10,784220	40
21	9,162025	9,995372	9,166654	10,833346	9,210760	9,994191	9,216568	10,783432	39
22	9,162885	9,995353	9,167532	10,832468	9,211526	9,994171	9,217356	10,782644	38
23	9,163743	9,995334	9,168409	10,831591	9,212291	9,994150	9,218142	10,781858	37
24	9,164600	9,995316	9,169284	10,830716	9,213055	9,994129	9,218926	10,781074	36
25	9,165454	9,995297	9,170157	10,829843	9,213818	9,994108	9,219710	10,780290	35
26	9,166307	9,995278	9,171029	10,828971	9,214579	9,994087	9,220491	10,779508	34
27	9,167158	9,995260	9,171899	10,828101	9,215338	9,994066	9,221272	10,778728	33
28	9,168008	9,995241	9,172767	10,827233	9,216097	9,994044	9,222052	10,777948	32
29	9,168856	9,995222	9,173634	10,826366	9,216854	9,994024	9,222830	10,777170	31
30	9,169702	9,995203	9,174499	10,825501	9,217609	9,994003	9,223607	10,716393	30
31	9,170546	9,995184	9,175362	10,824638	9,218363	9,993982	9,224382	10,775618	29
32	9,171389	9,995165	9,176224	10,823776	9,219116	9,993960	9,225156	10,774844	28
33	9,172230	9,995146	9,177084	10,822916	9,219862	9,993939	9,225929	10,774071	27
34	9,173070	9,995127	9,177942	10,822057	9,220618	9,993918	9,226704	10,773300	26
35	9,173908	9,995108	9,178799	10,821201	9,221367	9,993897	9,227471	10,772529	25
36	9,174744	9,995089	9,179655	10,820345	9,222115	9,993875	9,228240	10,771760	24
37	9,175578	9,995070	9,180508	16,819492	9,222861	9,993854	9,229007	10,770993	23
38	9,176411	9,995061	9,181360	10,818640	9,223606	9,993832	9,229774	10,770226	22
39	9,177242	9,996032	9,182211	10,817789	9,224349	9,993811	9,230539	10,769461	21
40	9,178072	9,995011	9,183060	10,816940	9,225092	9,993789	9,231302	10,768698	20
41	9,178900	9,994993	9,183907	10,816093	9,225833	9,993768	9,232065	10,767935	19
42	9,179726	9,994974	9,184752	10,815248	9,226573	9,993746	9,232826	10,767174	18
43	9,180551	9,994955	9,185597	10,814403	9,227311	9,993725	9,233586	10,766414	17
44	9,181374	9,994935	9,186439	10,813561	9,228048	9,993703	9,234345	10,765655	16
45	9,182196	9,994916	9,187280	10,812720	9 228784	9,993681	9,235103	10,764897	15
46	9,183016	9,994896	9,188120	10,811880	9,239518	9,993660	9,235859	10,764141	14
47	9,183834	9,994876	9,188957	10,811042	9,230252	9,993638	9,236614	10,763386	13
48	9,184651	9,994857	9,189794	10,810206	9,230984	9,993616	9,237368	10,762632	12
49	9,185466	9,994838	9,190629	10,809371	9,221715	9 993594	9,238120	10,761880	11
50	9,186280	9,994818	9,191462	10,808538	9,232444	9,693572	9,238872	10,761128	10
51	9,187092	9,994798	9,192294	10,807706	9,133172	9,993550	9,239622	10,760378	9
52	9,187903	9,994779	9,193124	10,806876	9,233899	9,993528	9,240371	10,759629	8
53	9,188712	9,994759	9,193953	10,806047	9,234625	9,993506	9,241118	10,758882	7
54	9,189519	9,994739	9,194780	10,805220	9,235349	9,993484	9,241865	10,758135	6
55	9,190325	9,994719	9,195606	10,804394	9,236073	0,993462	9,242610	10,757390	5
56	9,191130	9,994699	9,196440	10,803569	9,236795	9 993440	9,243354	10,756646	4
57	9,191933	9,994680	9,197253	10,802747	9,237515	9,993418	9 244097	10,755903	3
58	9,192734	9,994660	9,198674	10,801926	9,238835	9,993396	9,244839	10,755161	2
59	9,193534	9,994640	9,198894	10,801106	9,238952	9,993374	9,245579	10,754421	1
60	9,194332	9,994620	9,199713	10,800287	9,239670	9,993351	9,246319	10,753681	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent.	M
	Degree 81.				Degree 80.				

	Degree 10.				Degree 11.				
M	Sine	Co-sine	Tanget,	Co-tang	Sine	Co-sine	Tanget.	Co-tang.	
0	9,239670	9,993351	9,246319	10,753681	9,280599	9,991947	9,288652	10,711348	60
1	9,240386	9,993329	9,247057	10,752943	9,281229	9,991922	9,289326	10,710674	59
2	9,241101	9,993307	9,247794	10,752206	9,281897	9,991897	9,289999	10,710001	58
3	9,241814	9,993284	9,248530	10,751470	9,282544	9,991873	9,290671	10,709329	57
4	9,242526	9,993262	9,249264	10,750736	9,283190	9,991848	9,291342	10,708658	56
5	9,243237	9,993240	9,249998	10,750002	9,283836	9,991823	9,292013	10,707987	55
6	9,243947	9,993217	9,250730	10,749270	9,284480	9,991799	9,292682	10,707318	54
7	9,244656	9,993195	9,251461	10,748539	9,285124	9,991774	9,293350	10,706650	53
8	9,245363	9,993172	9,252191	10,747809	9,285766	9,991749	9,294017	10,705983	52
9	9,246070	9,993149	9,252920	10,747080	9,286408	9,991724	9,294684	10,705316	51
10	9,246775	9,993127	9,253648	10,746352	9,287048	9,991699	9,295349	10,704651	50
11	9,247478	9,993104	9,254374	10,745626	9,287688	9,991674	9,296013	10,703987	49
12	9,248181	9,993081	9,255100	10,744900	9,288326	9,991649	9,296677	10,703323	48
13	9,248883	9,993059	9,255824	10,744176	9,288964	9,991624	9,297339	10,702661	47
14	9,249583	9,993036	9,256547	10,743453	9,289600	9,991599	9,298001	10,701999	46
15	9,250282	9,993013	9,257269	10,742731	9,290236	9,991574	9,298662	10,701338	45
16	9,250980	9,992990	9,257990	10,742010	9,290870	9,991549	9,299322	10,700678	44
17	9,251677	9,992967	9,258710	10,741290	9,291504	9,991524	9,299980	10,700020	43
18	9,252373	9,992944	9,259429	10,740571	9,292137	9,991498	9,300638	10,699362	42
19	9,253067	9,992921	9,260146	10,739854	9,292768	9,991473	9,301295	10,698705	41
20	9,253761	9,992898	9,260863	10,739137	9,293399	9,991448	9,301951	10,698049	40
21	9,254453	9,992875	9,261578	10,738422	9,294029	9,991422	9,302607	10,697393	39
22	9,255144	9,992852	9,262292	10,737708	9,294658	9,991397	9,303261	10,696739	38
23	9,255834	9,992829	9,263005	10,736995	9,295286	9,991372	9,303914	10,696086	37
24	9,256523	9,992806	9,263717	10,736283	9,295913	9,991346	9,304567	10,695433	36
25	9,257211	9,992783	9,264428	10,735572	9,296539	9,991321	9,305218	10,694782	35
26	9,257898	9,992759	9,265138	10,734862	9,297164	9,991295	9,305867	10,694131	34
27	9,258583	9,992736	9,265847	10,734153	9,297788	9,991270	9,306519	10,693481	33
28	9,259268	9,992713	9,266555	17,733445	9,298412	9,991244	9,307168	10,692832	32
29	9,259951	9,992690	9,267261	10,732739	9,299034	9,991218	9,307816	10,692184	31
30	9,260633	9,992666	9,267967	10,732033	9,299655	9,991193	9,308463	10,691537	30
31	9,261314	9,992643	9,268671	10,731329	9,300276	9,991167	9,309109	10,690891	29
32	9,261994	9,992619	9,269375	10,730625	9,300895	9,991141	9,309754	10,690246	28
33	9,262673	9,992596	9,270778	10,729923	9,301514	9,991115	9,310399	10,689601	27
34	9,263351	9,992572	9,271479	10,729221	9,302132	9,991090	9,311042	10,688958	26
35	9,264027	9,992549	9,271479	10,728521	9,302749	9,991064	9,311685	10,688315	25
36	9,264703	9,992525	9,272178	10,727822	9,303364	9,991038	9,312327	10,687673	24
37	9,265378	9,992501	9,272876	10,727124	9,303979	9,991012	9,312968	10,687032	23
38	9,266051	9,992478	9,273573	10,726427	9,304593	9,990986	9,313608	10,686392	22
39	9,266723	9,992454	9,274269	10,725731	9,305207	9,990960	9,314247	10,685753	21
40	9,267395	9,992430	9,274964	10,725036	9,305819	9,990934	9,314885	10,685115	20
41	9,268065	9,992406	9,275658	10,724342	9,306430	9,990908	9,315523	10,684477	19
42	9,268734	9,992382	9,276351	10,723649	9,307041	9,990882	9,316159	10,683841	18
43	9,269402	9,992362	9,277043	10,722957	9,307650	9,990855	9,316795	10,683205	17
44	9,270069	9,992335	9,277734	10,722267	9,308259	9,990829	9,317430	10,682570	16
45	9,270735	9,992311	9,278424	10,721576	9,308867	9,990803	9,318064	10,681936	15
46	9,271400	9,992287	9,279113	10,720887	9,309474	9,990777	9,318697	10,681303	14
47	9,272063	9,992263	9,279801	10,720199	9,310080	9,990750	9,319330	10,680670	13
48	9,272726	9,992239	9,280488	10,719512	9,310685	9,990724	9,319961	10,680039	12
49	9,273388	9,992214	9,281174	10,718826	9,311289	9,990697	9,320592	10,679408	11
50	9,274049	9,992190	9,281858	10,718142	9,311893	9,990671	9,321222	10,678778	10
51	9,274708	9,992166	9,282542	10,717458	9,312495	9,990645	9,321851	10,678149	9
52	9,275367	9,992142	9,283225	10,716775	9,313097	9,990618	9,322479	10,677521	8
53	9,276025	9,992118	9,283907	10,716093	9,313698	9,990591	9,323106	10,676894	7
54	9,276681	9,992093	9,284588	10,715412	9,314297	9,990565	9,323733	10,676267	6
55	9,277337	9,992069	9,285268	10,714732	9,314897	9,990538	9,324358	10,675642	5
56	9,277991	9,992045	9,285946	10,714053	9,315495	9,990512	9,324983	10,675017	4
57	9,278685	9,992020	9,286624	10,713376	9,316092	9,990485	9,325607	10,674393	3
58	9,279297	9,991996	9,287301	10,712699	9,316689	9,990458	9,326231	10,673769	2
59	9,279948	9,991971	9,287977	10,712023	9,317284	9,990431	9,326853	10,673147	1
60	9,280599	9,991947	9,288652	10,711348	9,317879	9,990404	9,327475	10,672525	0
	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
	Degree 79.				Degree 78.				

	Degree 12.				Degree 13				
M	Sine	Co-sine.	Tanget.	Co-tang.	Sine	Co-sine	Tanget.	Co-tang.	
0	9,317879	9,990404	9,327475	10,672525	9,352088	9,988724	9,363364	10,636636	60
1	9,318473	9,990377	9,328095	10,671905	9,352635	9,988695	9,363940	10,636060	59
2	9,319066	9,990351	9,328715	10,671285	9,353181	9,988666	9,364515	10,635485	58
3	9,319658	9,990324	9,329334	10,670666	9,353726	9,988636	9,365090	10,634910	57
4	9,320250	9,990297	9,329953	10,670047	9,354271	9,988607	9,365664	10,634336	56
5	9,320840	9,990270	9,320570	10,669430	9,354185	9,988578	9,366237	10,633763	55
6	9,321430	9,990242	9,331187	10,668813	9,355358	9,988548	9,366810	10,633190	54
7	9,322019	9,990215	9,331803	10,668197	9,355901	9,988519	9,367382	10,632618	53
8	9,322607	9,990188	9,332418	10,667582	9,356443	9,988489	9,367953	10,632047	52
9	9,323194	9,990161	9,333033	10,666967	9,356984	9,988460	9,368524	10,631476	51
10	9,323780	9,990134	9,333646	10,666354	9,357524	9,988430	9,369094	10,630906	50
11	9,324366	9,990107	9,334259	10,665741	9,358064	9,988401	9,369663	10,630337	49
12	9,324950	9,990079	9,334871	10,665129	9,358603	9,988371	9,370232	10,629768	48
13	9,325534	9,990052	9,335482	10,664518	9,359141	9,988341	9,370799	10,629201	47
14	9,326117	9,990025	9,336093	10,663907	9,359679	9,988312	9,371367	10,628633	46
15	9,326699	9,989997	9,336702	10,663298	9,350215	9,988282	9,371933	10,628067	45
16	9,327281	9,989970	9,337311	10,662689	9,360752	9,988252	9,372499	10,627501	44
17	9,327862	9,989942	9,337919	10,662081	9,361287	9,988223	9,373064	10,626936	43
18	9,328441	9,989915	9,338527	10,661473	9,361822	9,988193	9,373629	10,626371	42
19	9,329020	9,989887	9,339133	10,660867	9,362356	9,988163	9,374193	10,625807	41
20	9,329599	9,989860	9,339739	10,660261	9,362889	9,988133	9,374756	10,625244	40
21	9,330176	9,989832	9,340344	10,659656	9,363422	9,988103	9,375319	10,624681	39
22	9,330753	9,989804	9,340948	10,659052	9,363954	9,988073	9,375881	10,624119	38
23	9,331328	9,989777	9,341552	10,658448	9,364485	9,988043	9,376442	10,623558	37
24	9,331903	9,989749	9,342155	10,657845	9,365016	9,988013	9,377003	10,622997	36
25	9,332478	9,989721	9,342757	10,657243	9,365546	9,987983	9,377563	10,622437	35
26	9,333051	9,989693	9,343358	10,656642	9,366075	9,987953	9,378122	10,621878	34
27	9,333624	9,989665	9,343958	10,656042	9,366604	9,987922	9,378681	10,621319	33
28	9,334195	9,989637	9,344558	10,655442	9,367132	9,987892	9,379239	10,620761	32
29	9,334766	9,989609	9,345157	10,654843	9,367659	9,987862	9,379797	10,620203	31
30	9,335337	9,989581	9,345755	10,654245	9,368185	9,987832	9,380354	10,619646	30
31	9,335906	9,989553	9,346353	10,653647	9,368711	9,987801	9,380910	10,619090	29
32	9,336475	9,989525	9,346949	10,653051	9,369236	9,987771	9,381466	10,618534	28
33	9,337043	9,989597	9,347545	10,652455	9,369761	9,987740	9,382021	10,617980	27
34	9,337610	9,989469	9,348141	10,651859	9,370285	9,987710	9,382575	10,617425	26
35	9,338176	9,989441	9,348735	10,651265	9,370808	9,987679	9,383129	10,616871	25
36	9,338742	9,989413	9,349329	10,650671	9,371332	9,987649	9,383682	10,616318	24
37	9,339306	9,989384	9,349922	10,650078	9,371851	9,987618	9,384234	10,615766	23
38	9,339870	9,989356	9,350514	10,649486	9,372373	9,987588	9,384786	10,615214	22
39	9,340434	9,989328	9,351106	10,648894	9,372894	9,987557	9,385337	10,614663	21
40	9,340996	9,989299	9,351697	10,648303	9,373414	9,987526	9,385888	10,614112	20
41	9,341558	9,989271	9,352287	10,647713	9,373933	9,987496	9,386438	10,613562	19
42	9,342119	9,989243	9,352876	10,647124	9,374452	9,987465	9,386987	10,613013	18
43	9,342679	9,989214	9,353465	10,646535	9,374970	9,987434	9,387536	10,612464	17
44	9,343239	9,989186	9,354053	16,645947	9,375487	9,987403	9,388084	10,611916	16
45	9,343797	9,989157	9,354640	10,645360	9,376093	9,987372	9,388631	10,611369	15
46	9,344355	9,989128	9,355227	10,644773	9,376519	9,987341	9,389178	10,610822	14
47	9,344912	9,989100	9,355812	10,644187	9,377035	9,987310	9,389724	10,610276	13
48	9,345469	9,989071	9,356398	10,643602	9,377549	9,987279	9,390270	10,609730	12
49	9,346024	9,989042	9,356982	10,643018	9,378063	9,987248	9,390815	10,609185	11
50	9,346579	9,989014	9,357566	10,642434	9,378577	9,987217	9,391360	10,608640	10
51	9,347134	9,988985	9,358149	10,641851	9,379089	9,987186	9,391907	10,608097	9
52	9,347687	9,988956	9,358731	10,641269	9,379601	9,987155	9,392467	10,607553	8
53	9,348240	9,988927	9,359313	10,640687	9,380113	9,987124	9,392989	10,607011	7
54	9,348792	9,988898	9,359893	10,640107	9,380624	9,987092	9,393531	10,606469	6
55	9,349343	9,988869	9,360474	16,639526	9,381134	9,987061	9,394074	10,605927	5
56	9,349893	9,988840	9,361053	10,638947	9,381643	9,987030	9,394614	10,605386	4
57	9,350443	9,988811	9,361632	10,638368	9,382152	9,986998	9,395154	10,604846	3
58	9,350992	9,988782	9,362210	10,637790	9,382661	9,986967	9,395694	10,604306	2
59	9,351540	9,988754	9,362787	10,637213	9,383168	9,986936	9,396233	10,603767	1
60	9,352088	9,988724	9,363364	10,636636	9,383675	9,986904	9,396771	10,603229	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent,	M
	Degree 77.				Degree 76.				

	Degree 14.			
M	Sine	Co-sine.	Tangent,	Co-tang
0	9,383675	9,986904	9,396771	10,603229
1	9,384181	9,986873	9,397309	10,602694
2	9,384687	9,986841	9,397846	10,602154
3	9,385192	9,986809	9,398383	10,601617
4	9,385697	9,986778	9,398919	10 601081
5	9,386201	9,986746	9 399455	10,600545
6	9,386704	9,986714	9,399990	10,600010
7	9,387207	9,986683	9,400524	10,599476
8	9,387709	9,986651	9,401058	10,598942
9	9,388210	9,986619	9,401591	10,598409
10	9,388711	9,986587	9,402124	10,597876
11	9,389211	9,986555	9,402656	10,597344
12	9 389711	9,986523	9,403187	10,596813
13	9,390210	9,986491	9 403718	10,596282
14	9,390708	9,986459	9,404249	10,595751
15	9,391206	9,986427	9,404778	17,595222
16	9,391703	9,986395	9,405306	10,594692
17	9,392199	9 986363	9,405836	10,594164
18	9,392695	9,986331	9,406364	10,593636
19	9,393190	9,986299	9,406892	10,593608
20	9,393685	9,986266	9,407419	10,592581
21	9,394179	9,986234	9,407945	10,592055
22	6,394673	9,986201	9,408471	10,591529
23	9,395166	9,986169	9,408996	10,591001
24	9,395654	9,986137	9,409521	10,590479
25	9,396150	9,986104	9,410045	10,589954
26	9,396641	9,986072	9,410569	10,589431
27	9,397131	9,986039	9,411092	10,588908
28	9,397621	9,986007	9,411615	10,588385
29	9,398111	9,985974	9,412137	10,587863
30	9,398600	9,985942	9,412658	10,587342
31	9,399087	9,985909	9,413179	10,586821
32	9,399575	9,985876	9,413699	10,586301
33	9,400062	9,985843	9,414219	10,585781
34	9,400549	9,985811	9,414738	10,585262
35	9,401035	9,985778	9,415257	10,584742
36	9,401520	9,985745	9,415775	10,584225
37	9,402005	9,985712	9,416293	10,583707
38	9,402489	9,985679	9,416810	10,583190
39	9,402972	9,985646	9,417326	10,582674
40	9,403455	9,985613	9,417842	10,582157
41	9,403938	9,985580	9,418357	10,581642
42	9,404420	9,985547	9,418873	10,581127
43	9,404901	9,985513	9,419387	10,580613
44	9,405382	9,985480	9,419901	10,580099
45	9,405862	9,985447	9,420415	10,579585
46	9,406341	9 985414	9,420927	10,579072
47	9,406820	9 985380	9,421440	10,578560
48	9,407299	9 985347	9,421951	10,578048
49	9,407776	9,985314	9,422463	10,577537
50	9,408254	9,985280	9,422973	10,577026
51	9,408731	9,985247	9,423484	10,576516
52	9,409207	9,985213	9,423993	10,576007
53	9,409682	9,985180	9,424503	10,575497
54	9,410157	9,985146	9,425011	10,574989
55	9,410632	9,985112	9,425518	10,574480
56	9,411106	9,985079	9,426027	10,573973
57	9,411579	9,985045	9,426534	10,573466
58	9,412052	9,985011	9,427041	10,572959
59	9,412524	9,984977	9 427547	10,572453
60	9,412996	9,984943	9,428052	10,571947
M	Co-sine	Sine	Co-tang.	Tangent
	Degree 75.			

Degree 15.				
Sine	Co-sine	Tangent.	Co-tang.	
9,412996	9,984944	9,428052	10,571947	60
9,413467	9,984910	9,428557	10,571442	59
9,413938	9,984876	9,429062	10,570938	58
9,414408	9,984842	9,429566	10,570434	57
9,414878	9,984808	9,420070	10,579930	56
9,415347	9,984774	9,420573	10,579427	55
9,415815	9,984740	9,431075	10,568925	54
9,416283	9,984706	9,431577	10,568423	53
9,416850	9,984672	9,432079	10,567921	52
9,417217	9,984637	9,432580	10,567420	51
9,417684	9,984603	9,433080	10,566920	50
9,418149	9,984569	9,433580	10,566419	49
9,418615	9,984535	9,434080	10,565920	48
9,419079	9,984500	9,434579	10,565421	47
9,419544	9,984466	9,435078	10,564922	46
9,420007	9,984431	9,435576	10,564424	45
9,420470	9,984397	9,436073	10,563927	44
9,420933	9 984363	9,436570	10,563430	43
9,421395	9,984328	9,437067	10,562933	42
9,421856	9,984293	9,437563	10,562437	41
9,422317	9,984259	9,438059	10,561941	40
9,422778	9,984224	9,438554	10,561446	31
9,423238	9,984189	9,439548	10,560952	38
9,423697	9,984155	9,439543	10,560457	37
9,424156	9,984120	9,440036	10,559964	36
9,424615	9,984085	9,440529	10,559471	35
9,425072	9,984050	9,441022	10,558978	34
9,425530	9,984015	9,441514	10,558486	33
9,425987	9,983980	9,442006	10,557994	32
9,426443	9,983945	9,442497	10,557503	31
9,426899	9,983910	9,442988	10,557011	30
9,427354	9,983875	9,443479	10,556521	29
9,427809	9,983840	9,443968	10,556031	28
9,428264	9,983805	9,444458	10,555542	27
9,428717	9,983770	9,444947	10,555053	26
9,429170	9,983735	9,445435	10,554565	25
9,429623	9,983699	9,445923	10,554077	24
9,430075	9,983664	9,446411	10,553589	23
9,430507	9,983629	9,446898	10,553102	22
9,430978	9,983593	9,447384	10,552616	21
9,431429	9,983558	9,447870	10,552129	20
9,431879	9,983523	9,448356	10,551644	19
9,432328	9,983487	9,448841	10,551159	18
9,432778	9,983452	9,449326	10,550674	17
9,433206	9,983416	9,449810	10,550181	16
9,433674	9,983380	9,450294	10,559706	15
9,434122	9,983345	9,450777	10,549223	14
9,434569	9,983309	9,451260	10,548740	13
9,435016	9,983273	9,451743	10,548257	12
9,435462	9,983238	9,452225	10,547775	11
9,435918	9,983202	9,452706	10,547294	10
9,436353	9,983166	9,453187	10,546813	9
9,436798	9,983130	9,453668	10,546332	8
9,437242	9,983094	9,454148	10,145852	7
9,437686	9,983058	9,454629	10,545372	6
9,438129	9,983022	9 455107	10,544893	5
9,438572	9,982986	9 455586	10,544414	4
9,439014	9,982950	9,456064	10,543936	3
9,439456	9,982914	9,456542	10,543458	2
9,439897	9,982878	9,457019	10,542980	1
9,440338	9,982842	9,457496	10,542503	0
Co-sine	Sine	Co-tang.	Tangent	M
	Degree 74.			

	Degree 16.				Degree 17.				
M	Sine	Co-sine	Tangent	Co-tang.	Sine	Co-sine	Tangent	Co-tang.	
0	9,440338	9 982842	9,457496	10,542503	9,465935	9,980596	9,485339	10,514661	60
1	9,440778	9,982805	9,457973	10,542027	9,466348	9,980558	9,485791	10,514209	59
2	9,441218	9,982769	9,458449	10,541551	9,466761	9,980519	9,486242	10,513758	58
3	9,441658	9,982733	9,458925	10 541075	9,467173	9,980480	9,486693	10,513307	57
4	9,442096	9,982696	9,459400	10,540600	9,467585	9,980441	9,487143	10,512857	56
5	9,442535	9,982660	9,459875	10,540125	9,467996	9,980403	9,487593	10,512407	55
6	9,442973	9,982623	9,460349	10,539651	9,468407	9,980364	9,488043	10,511957	54
7	9,443416	9,982587	9,460829	10,539177	9,468817	9,980325	9,488493	10,511507	53
8	9,443848	9,982550	9,461297	10,538703	9,469227	9,980286	9,488941	10,511059	52
9	9,444284	9,982514	9,461770	10,538230	9,469637	9,980247	9,489390	10,510610	51
10	9,444720	9,982477	9,462242	10,537758	9,460446	9,980208	9,489838	10,510162	50
11	9,445155	9,982441	9,462714	10,537285	9,470455	9,980169	9.490286	10,509714	49
12	9,445590	9 982404	9 463186	10,536814	9,471863	9,980130	9,490733	10,509267	48
13	9,446025	9,982367	9,463658	10,536342	9,471071	9,980091	9,491180	10,508820	47
14	9,446459	9,982330	9,464129	10,535871	9,471678	9,980052	9,491627	10,508373	46
15	9,446893	9,982294	9,464599	10,535401	9,472086	9,980012	9,492073	10,507928	45
16	9,447326	9,982257	9,465069	10,534931	9,472492	9,979973	9,492519	10,507481	44
17	9,447759	9,982220	9,465539	10,534461	9,472898	9,979934	9,492964	10,507035	43
18	9,448191	9,982183	9 466008	10,533992	9,473304	9,979894	9,493410	10,506590	42
19	9,448623	9,982146	9,466476	10,533523	9,473710	9 979855	9,493854	10,506145	41
20	9,449054	9,982109	9,466945	10 533055	9,474115	9,979816	9,494299	10,505701	40
21	9,449485	9,982072	9,467413	10,532587	9,474519	9,979776	9,494743	10,505257	39
22	9,449915	9,982035	9,467880	10,532120	9,474923	9,979737	9,495186	10,504813	38
23	9,450345	9,981998	9,468347	10,531653	9,475327	9,979697	9 495630	10,504370	37
24	9,450775	9,981961	9,468814	10,531186	9,475730	9 979658	9,496073	10,503928	36
25	9,451203	9,981923	9,469280	10.530720	9,476133	9,979618	9,496515	10,503485	35
26	9,451632	9,981886	9,469746	10,530254	9,476536	9,979578	9 496957	10,503043	34
27	9,452060	9,981849	9,470211	10,529789	9,476938	9,979539	9.497399	10,502601	33
28	9,452488	9,981812	9 470676	10,529324	9,477340	9,979499	9,497840	10,502160	32
29	9,452915	9,981774	9,471141	10,528859	9,477741	9,979459	9,498282	10.501718	31
30	9,453342	9,981737	9,471605	10,528395	9,478142	9,979419	9,498722	10,501278	30
31	9,453768	9,981699	9,472068	10,527931	9,478542	9,979380	9,499163	10,500837	29
32	9,454194	9,981662	9,472532	10,527468	9,478942	9,979340	9,499602	10,500398	28
33	9,454619	9,981624	9,472995	10,527005	9,479342	9,979300	9,500042	10,499958	27
34	9,455044	9,981587	9,473457	10,526543	9,479741	9,979260	9,500481	10,499519	26
35	9,455469	9,981549	9,473919	10,526081	9,480140	9,979220	9,500920	10,499080	25
36	9,455892	9,981512	9,474381	10,525619	9,480538	9,979180	9,501359	10,498641	24
37	9,456316	9,981474	9,474842	10,525158	9,480936	9,979140	9,501797	10,498203	23
38	9,456739	9,981436	9,475303	10,524695	9,481334	9,979099	9,502234	10,497765	22
39	9 457162	9,981398	9,475763	10,524237	9 481731	9,979059	9,502672	10 497328	21
40	9,457584	9,981361	9,476223	10,523777	9,482128	9,979019	9.503109	10 496891	20
41	9,458006	9,981323	9,476683	10,523317	9,482525	9,978980	9.503546	10,496454	19
42	9,458427	9,981285	9,477142	10,522856	9,482921	9 978939	9 503982	10 496018	18
43	9,458848	9,981247	9,477601	10,522399	9,483316	9,978898	9,504418	10,495582	17
44	9,459263	9,981209	9 478059	10,521941	9,483711	9,978858	9,504854	10,495146	16
45	9.459684	9,981171	9,478517	10,521483	9,484106	9,978817	9,505289	10,494711	15
46	9,460108	9 981133	9 478975	10,521025	9,484501	9,978777	9,505724	10,494216	14
47	9,460527	9,981095	9.479432	10,520568	9,484895	9,978736	9,506158	10,493841	13
48	9,460946	9,981057	9,479889	10,520111	9 485289	9 978696	9,506593	10,493407	12
49	9,461364	9 981019	9,480345	10,519655	9,485682	9,978655	9 507026	10,492973	11
50	9,461782	9,980980	9,480801	10,519199	9,486075	9,978615	9,507459	10,492540	10
51	9,462199	9,980942	9,481257	10,518743	9.486467	9,978574	9,507892	10,492107	9
52	9,462616	9,980904	9,481712	10,518288	9,486859	9,978533	9,508326	10,491674	8
53	9,463032	9,980866	9,482167	10,517833	9,487251	9,978493	9 508759	10,491241	7
54	9,463448	9,980827	9,482621	10,517379	9,487642	9,978452	9,509181	10,490809	6
55	9,463864	9,980789	9,483075	10,516925	9,488033	9,978411	9,509622	10,490377	5
56	9,464279	9,980750	9,483528	10,516471	9,488424	9,978370	9,510044	10,489946	4
57	9,464694	9,980712	9,483982	10,516018	9,488814	9,978329	9,510486	10,489515	3
58	9,465108	9,980672	9,484434	10,515565	9,489204	9,978288	9,510916	10,489084	2
59	9,465522	9,980635	9,484887	10,515113	9,489593	9,978247	9,511346	10,488654	1
60	9,465935	9,980596	9,485339	10,514661	9,489982	9,978206	9,511776	10,488225	0
	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
	Degree 73.				Degree 72.				

	Degree 18.				Degree 19				
M	Sine	Co-sine.	Tangent.	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	
0	9,489982	9,978206	9,511776	10,488224	9,512642	9,975670	9,536972	10,463028	60
1	9,490371	9,978165	9,512206	10,487794	9,513009	9,975626	9,537382	10,462618	59
2	9,490759	9,978124	9,512635	10,487365	9,513375	9,975583	9,537792	10,462208	58
3	9,491147	9,978083	9,513064	10,486936	9,513741	9,975539	9,538202	10,461798	57
4	9,491534	9,978042	9,513493	10,486507	9,514107	9,975496	9,538610	10,461389	56
5	9,491922	9,978000	9,513921	10,486079	9,514472	9 975452	9,539020	10,460980	55
6	9,492308	9,977959	9,514349	10,485651	9,514837	9,975408	9,539429	10,460571	54
7	9,492695	9,977918	9,514777	10,485223	9,515202	9,975364	9,539837	10,460163	53
8	9,493080	9,977877	9,515204	10,484796	9,515566	9,975321	9,540245	10,459755	52
9	9,493466	9,977835	9,515631	10,484369	9,515930	9,975277	9,540653	10,459347	51
10	9,493851	9,977794	9,516057	10,483943	9,516294	9,975233	9,541061	10,458939	50
11	9,494236	9,977752	9,516484	10,483516	9,516657	9,975189	9,541468	10,458532	49
12	9,494620	9,977711	9,516910	10,483098	9,517020	9,975145	9,541875	10,458125	48
13	9,495005	9 977669	9,517335	10,482665	9,517382	9,975101	9,542281	10,457719	47
14	9,495388	9,977628	9,517761	10,482239	9,517745	9,975057	9,542688	10,457312	46
15	9,495771	9,977586	9,518185	10,481814	9,518107	9,975013	9,543094	10,456906	45
16	9 496154	9,977544	9,518610	10,481390	9,518468	9,974969	9 543499	10,456501	44
17	9,496537	9,977503	9,519034	10,480966	9,518829	9,974925	9,543905	10,456095	43
18	9,496919	9,977461	9,519458	10,480542	9,519190	9,974880	9,544310	10,455690	42
19	9,497301	9,977419	9,519882	10,480118	9,519551	9,974836	9,544715	10,455285	41
20	9,497682	9,977377	9,520305	10,489695	9,519911	9 974792	9,545119	10,454881	40
21	9,498063	9,977335	9,520728	10,479272	9,520271	9,974747	9,545524	10,454476	39
22	9,498444	9,977293	9,521151	10,478849	9,520631	9,974703	9,545927	10,454072	38
23	9,498824	9,977251	9,521573	10,478427	9,520990	9,974659	9,546331	10,453669	37
24	9,499204	9,977209	9,521995	10,478005	9,521349	9,974614	9,546735	10,453265	36
25	9,499584	9,977167	9,522417	10,477583	9,521707	9,974570	9,547138	10,452852	35
26	9,499963	9,977125	9,522838	10,477162	9,522065	9,974525	9,547540	10,452459	34
27	9,500342	9,977083	9,523259	10,476741	9,522423	9,974480	9,547943	10,452057	33
28	9,500720	9,977041	9,523679	10,476320	9,522781	9,974436	9,548345	10,451655	32
29	9,501099	9,977999	9,524109	10,475900	9,523138	9,974391	9,548747	10,451253	31
30	9,501476	9,977956	9,524520	10,475480	9,523495	9,944346	9,549149	10,450851	30
31	9,501854	9,976914	9,524939	10,475060	9,523851	9,974302	9,549550	10,450450	29
32	9,502231	9,976872	9,525359	10,474641	9,524208	9,974257	9,549951	10,450249	28
33	9,502607	9,976830	9,525778	10,474222	9,524564	9,974212	9,550352	10,449648	27
34	9,502984	9,976787	9,526197	10,473803	9,524920	9,974167	9,550752	10,449248	26
35	9,503360	9,976745	9,526615	10,473385	9,525275	9,974122	9,551152	10,448848	25
36	9,503735	9,976702	9,527033	10,472967	9,525630	9,974077	9,551552	10,448448	24
37	9,504110	9,976660	9,527451	10,472549	9,525984	9,974032	9,551952	10,448048	23
38	9,504485	9,976617	9,527868	10,472132	9,526339	9,973987	9,552351	10,447649	22
39	9,504840	9,976574	9,528285	10,471715	9,526693	9,973942	9,552750	10,447250	21
40	9,505234	9,976532	9,528702	10,471298	9,527046	9,973897	9,553149	10,446851	20
41	9,505608	9,976489	9,529118	10,470881	9,527400	9,973852	9,553548	10,446452	19
42	9,505981	9,976446	9,529535	10,470465	9,527753	9 973807	9,553946	10,446054	18
43	9,506354	9,976404	9,529950	10,470049	9,528105	9,973761	9,554344	10,445656	17
44	9,506727	9,976361	9,530366	10,469634	9,528458	9,973716	9,554741	10,445259	16
45	9,507099	9,976318	9,530781	10,469219	9,528810	9 973671	9,555139	10,444861	15
46	9,507471	9,976275	9,531196	10,468804	9,529161	9,973625	9,555536	10,444464	14
47	9,507843	9,976232	9,531611	10,468389	9,529513	9,973580	9,555932	10,444068	13
48	9,508214	9,976185	9,532025	10 467975	9,529864	9,973535	9,556329	10,443671	12
49	9,508585	9,976146	9 532436	10,467561	9,530214	9,973489	9,556725	10,443275	11
50	9,508955	9,976103	9,532852	10,467147	9,530565	9,973443	9,557121	10,442879	10
51	9,509326	9,976060	9,533266	10,466734	9,530915	9 973398	9,557517	10,442483	9
52	9,509696	9,976017	9,533679	10,466321	9,531265	9,973352	9,557912	10,442088	8
53	9,510065	9,975973	9 534092	10,465908	9,531614	9,973307	9,558308	10,441693	7
54	9,510434	9,975930	9,534504	10,465496	9,531963	9,973261	9,558702	10,441298	6
55	9,510803	9,975887	9,534916	10 465084	9,532312	9,973215	9,559097	10,440903	5
56	9,511171	9,975844	9,535328	10,464672	9,532661	9,973169	9,559491	10,440509	4
57	9,511540	9,975800	9,535739	10,464261	9,533009	9,973123	9,559885	10,440115	3
58	9,511907	9,975757	9,536150	10,463849	9,533357	9,973078	9,560279	10,439721	2
59	9,512275	9,975713	9,536561	10,463439	9,533704	9,973032	9,560673	10,439327	1
60	9,512642	9,975670	9,536972	10,463028	9,534052	9,972986	9,561066	10,438934	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent,	M
	Degree 71.				Degree 70.				

Degree 20.					Degree 21.				
M	Sine	Co-sine	Tangent,	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	M
0	9,534052	9,972986	9,561066	10,438934	9,554329	9,970152	9,584177	10,415822	60
1	9,534399	9,972940	9,561459	10,438541	9,554658	9,970103	9,584555	10,415445	59
2	9,534746	9,972894	9,561851	10,438148	9,554987	9,970055	9,584932	10,415068	58
3	9,535091	9,972848	9,562244	10,437756	9,555315	9,970006	9,585308	10,414691	57
4	9,535437	9,972801	9,562636	10,437364	9,555643	9,969957	9,585686	10 414314	56
5	9,535782	9,972755	9,563028	10,436972	9,555971	9 969909	9,586062	10,413938	55
6	9,536129	9,972709	9,563419	10,436580	9,556299	9,969860	9,586439	10,413561	54
7	9.536474	9,972663	9,563811	10,436189	9,556626	9,969811	9,586815	10,413185	53
8	9,536818	9,972617	9,564202	10 435798	9,556953	9,969762	9,587190	10,412800	52
9	9,537163	9,972570	9,564592	10,435407	9,557279	9.969713	9,587566	10,412434	51
10	9,537507	9,972524	9,564983	10,435017	9,557606	9,969665	9,587941	10,412059	50
11	9,537851	9,972477	9,565373	10,434627	9,557932	9,969616	9,588316	10 411684	49
12	9,538194	9,972431	9,565763	10,434237	9,558258	9,969567	9,588691	10,411309	48
13	9,538537	9.972384	9,566153	10,433847	9 558583	9,969518	9,589056	10,410934	47
14	9,538880	9,972338	9,566542	10,433457	9,558909	9,969469	9,589440	10,410560	46
15	9.539222	9,972291	9,566932	10,433068	9,559234	9,969419	9,589814	10,410185	45
16	9,539565	9,972245	9,567320	10,432679	9 559558	9,969370	9,590188	10,409812	44
17	9,539907	9,972198	9,567709	10,432291	9,559883	9,969321	9,590561	10,409438	43
18	9,540249	9,972151	9,568097	10,431902	9,560207	9,969272	9,590935	10,409065	42
19	9,540590	9,972105	9,568486	10,431514	9,560531	9,969223	9,591308	10,408692	41
20	9.540931	9,972058	9,569873	10,431126	9,560855	9 969173	9,591681	10,408319	40
21	9,541272	9,972011	9,569261	10,430739	9,561178	9,969124	9,592054	10,407946	39
22	9,541612	9,971964	9 569648	10,430351	9,561501	9 969075	9,592426	10,407574	38
23	9,541953	9,971917	9,560035	10,429364	9,561824	9,969025	9,592798	10,407201	37
24	9 542292	9 971870	9,560422	10,429578	9,562146	9,968976	9,593170	10,406829	36
25	9,542632	9 971823	9,560809	10 429191	9,562468	9,968926	6,593542	10,406457	35
26	9,542971	9,971776	9,571195	10,428805	9,562790	9,968877	9,593914	10,406086	34
27	9 543310	9,971729	9,571581	10,428419	9,563112	9,968827	9,594285	10,405715	33
28	9,543649	9.971682	9,571967	10,428033	9,563433	9,968777	9,594656	10,405344	32
29	9,543987	9,971635	9,572352	10,427648	9,563754	9,968728	9,595027	10,405073	31
30	9,544325	9,971588	9,572738	10,427262	9,564075	9.968678	9,595397	10,404602	30
31	9,544663	9,971540	9,573123	10,426877	9,564396	9,968628	9,595768	10,404232	29
32	9,545000	9,971493	9,573507	10,426492	9,564716	9,968578	9,596138	10,403862	28
33	9,545338	9,971446	9,573892	10,426108	9,565036	9,968528	9,596508	10,403492	27
34	9,545674	9,971398	9,574276	10,425724	9,565356	9,968478	9,596878	10,403122	26
35	9,546011	9,971351	9,574660	10,425340	9,565675	9,968428	9,597247	10,402753	25
36	9,546347	9,971303	9,575044	10,424956	9,565995	9,968378	9,597616	10,402384	24
37	9,546683	9,971256	9,575427	10,424573	9,566314	9,968328	9,597985	10,402015	23
38	9,547019	9,971208	9,575810	10,424189	9,566632	9,968278	9,598354	10,401646	22
39	9,547354	9,971161	9,576193	10,423807	9,566951	9,968228	9,598722	10,401277	21
40	9,547689	9,971112	9,576576	10,423424	9,567269	9,968178	9,599091	10,400909	20
41	9,548024	9,971065	9.576958	10,423041	9,567587	9,963128	9,599459	10,400541	19
42	9,548358	9,971018	9,577341	10,422659	9,567904	9,968078	9,599827	10,400173	18
43	9,548693	9,970970	9,577723	10,422277	9,568222	9,968027	9,600194	10,399806	17
44	9,549026	9,970922	9,578104	10,421896	9,568539	9,967977	9,600562	10,399438	16
45	9 549360	9,970874	9,578486	10,421514	9,568855	9 967927	9 600929	10.399071	15
46	9,549693	9,970826	9 578867	10,421133	9.569172	9,967876	9,601296	10,398704	14
47	9,550026	9.970779	9,579248	10,420752	9,569488	9,967826	9,601662	10,398337	13
48	9,550359	9,970731	9,579628	10,420371	9,569804	9,967775	9,602029	10,397971	12
49	9,550692	9,970683	9,580009	10,419991	9,570120	9,967725	9,602395	10,397605	11
50	9,551024	9,970634	9,580389	10,419611	9,570435	9,967674	9,602761	10,397239	10
51	9.551355	9,970586	9,580769	10,419231	9.570751	9,967623	9,603127	10,396873	9
52	9,551687	9,970538	9,581149	10,418851	9,571065	9,967573	9,603493	10,396507	8
53	9 552018	9,970490	9,581528	10,418472	9,571380	9,967522	9,603858	10,396142	7
54	9,552349	9,970442	9,581907	10,418092	9,571695	9,967471	9,604223	10,395777	6
55	9,552680	9.970394	9.582286	10,417713	9,572009	9,967420	9,604588	10,395412	5
56	9,553010	9,970345	9,582665	10,417335	9,572322	9,967370	9.604953	10,395047	4
57	9,553340	9,970297	9,583043	10,416956	9,572636	9,967319	9,605317	10,394683	3
58	9,553670	9,970249	9,583422	10,416578	9,572949	9,967268	9,605681	10,394318	2
59	9,554000	9,970200	9,583800	10,416200	9,573263	9,967217	9,606046	10 393954	1
60	9,554329	9 970152	9,584177	10,415823	9,573575	6 967166	9,606409	10,393590	0
	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
Degree 69.					Degree 68.				

	Degree 22.				Degree 23				
M	Sine	Co-sine.	Tangent.	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	
0	9,573575	9,967166	9,606409	10,393590	9,591878	9,964026	9,627852	10 372148	60
1	9,573868	9,967115	9,606773	10,393227	9,592175	9,963972	9,628203	10,371797	59
2	9,574200	9 967064	9,607136	10,392863	9,592473	9,963919	9,628554	10,371446	58
3	9,574512	9,967012	9,607500	10,392500	9,592770	9,963865	9,628905	10,371095	57
4	9 574824	9,966961	9,607862	10,392137	9,593067	9,963811	9,629255	10,370744	56
5	9,575135	9,966910	9,608225	10,391774	9,593363	9,963757	9,629606	10 370394	55
6	9,575447	9,966859	9,608588	10,391412	9,593659	9,963703	9,629956	10,370044	54
7	9,575758	9,966807	9,608950	10,391050	9,593955	9,963650	9,630306	10,369694	53
8	9,576068	9,966756	9,609312	10,390688	9,594251	9,963596	9,630655	10,369344	52
9	9 576379	9,966705	9,609674	10,390326	9,594547	9,963542	9,631005	10,368995	51
10	9,576689	9,966653	9,600036	10,389964	9,594842	9,963488	9,631354	10,368645	50
11	9,576999	9,966602	9,610397	10,389603	9,595137	9,963433	9,631704	10,368296	49
12	9,577309	9,966550	9,610758	10,389241	9,595432	9,963379	9,632053	10,367947	48
13	9,577618	9,966499	9,611119	10,388880	9,595727	9,963325	9,632401	10 367598	47
14	9,577927	9,966447	9,611480	10,388520	9 596021	9,963271	9 632750	10,367250	46
15	9,578236	9,966395	9,611841	10 388159	9,596315	9,963217	9,633098	10,366901	45
16	9,578545	9 966344	9,612201	10,387799	9,596610	9,963102	9,633447	10.366553	44
17	9,578853	9,966292	9,612561	10,387438	9,596903	9,963108	9,633795	10,366205	43
18	9,579161	9,966240	9,612921	10,387078	9,597196	9,963054	9,634143	10,365857	42
19	9,579469	9,966188	9,613281	10,386719	9,597490	9,962999	9,634490	10,365510	41
20	9,579777	9,966136	9,613641	10,386359	9,597783	9,962945	9 634838	13,365162	40
21	9,580084	9,966084	9,614000	10,386000	9,598075	9 962892	9,635185	10,364815	39
22	9,580392	9,966032	9,614359	10,385641	9,598368	9,962836	9,635530	10,364468	38
23	9,580698	9,965980	9,614718	10,385282	9,598660	9,962781	9 635879	10,364121	37
24	9,581005	9,965928	9,615077	10 384923	9,598952	9,962726	9,636226	10,363774	36
25	9,581311	9,965876	9,615435	10 384565	9,599244	9,962672	9,636572	10,363428	35
26	9,581618	9,965824	9,615793	10,384207	9,599536	9 962617	9,636918	10,363081	34
27	9,581923	9,965772	9,616151	10,383448	9,599827	9,962562	9,637205	10,362735	33
28	9,582229	9,965720	9,616509	10,383491	9,600118	9,962507	9,637610	10,362389	32
29	9,582534	9,965668	9,616867	10,383133	9,600409	9,962453	9,637956	10,362044	31
30	9,582840	9,965615	9,617224	10,382776	9,600700	9,962398	9,638302	10,361698	30
31	9,583144	9,965563	9,617581	10,382418	9,600990	9,962343	9,638647	10,361353	29
32	9,183449	9,965511	9,617938	10,382061	9,601280	9,962288	9,638992	10,361007	28
33	9,583753	9,965458	9,618295	10,381705	9,601570	9,962233	9,639337	10,360662	27
34	9,584058	9,965406	9,618652	10,381348	9 601860	9,962178	9,639682	10,360318	26
35	9,584361	9,965353	9,619008	10,380992	9 602149	9,962122	9,640027	10,359973	25
36	9,584665	9,965301	9,619364	10,380635	9,602439	9,962067	9,640371	10,359629	24
37	9,584968	9,965248	9,619720	10,380279	9,602728	9 962012	9,640716	10,359284	23
38	9,585271	9 965195	9,620076	10,379924	9,603017	9,961957	9,641060	10,358940	22
39	9,585574	9,965143	9,620432	10,379568	9,603305	9,961902	9,641404	10,358596	21
40	9,585877	9,965090	9,620787	10,379213	9,603594	9,961846	9,641747	10,358253	20
41	9,586179	9,965037	9,621142	10,378858	9,603882	9,961791	9,642091	10 357909	19
42	9,586481	9,964984	9,621497	10,378503	9,604170	9,961735	9,642434	10,357566	18
43	9,586783	9,964931	9,621852	10,378148	9,604457	9,961680	9,642777	10,357223	17
44	9,587085	9 964878	9,622206	10,377793	9,604745	9,961624	9,643120	10,356980	16
45	9,587386	9,964825	9,622561	10 377439	9,605032	9,961569	9,643463	10,356537	15
46	9,587687	9,964772	9,622915	10,377085	9,605319	9,961513	9,643806	10,356194	14
47	9,587988	9,964719	9,623269	10,376731	9,605606	9,961458	9,644148	10,355852	13
48	9,588289	9,964666	9,623623	10,376377	9,605892	9,961402	9,644490	10,355510	12
49	9,588589	9 964613	9 623976	10,376024	9,606179	9,961346	9,644832	10 355168	11
50	9,588890	9,964560	9 624330	10,375670	9,606465	9 961290	9,645174	10,354826	10
51	9,589190	9,964507	9,624683	10,375317	9,606750	9 961235	9,645516	10,354484	9
52	9,589489	9,964454	9,625036	10,374964	9,607036	9,961179	9,645857	10 354142	8
53	9,589789	9,954400	9,625388	10,374612	9,607322	9,961123	9,646199	10,353801	7
54	9,590088	9,964347	9,625741	10,374259	9,607607	9,961067	9,646540	10,353460	6
55	9,590387	9,964294	9,626093	10,373907	9,607892	9,961011	9,646881	10 353119	5
56	9,590686	9,964240	9,626445	10,373555	9,608176	9,960955	9,647222	10,352778	4
57	9,590984	9,964187	9,626797	10,373203	9,608461	9,960899	9,647562	10,352438	3
58	9,591282	9,964133	9,627149	10,372850	9,608745	9 960842	9,647903	10,352097	2
59	9,591580	9,964080	9,627501	10,372499	9,609029	9,960786	9,648243	10,351757	1
60	9,591878	9,964026	9,627852	10,372148	9 609313	9,960730	9,648583	10.351417	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent.	M
	Degree 67.				Degree 66.				

	Degree 24.				Degree 25.				
M	Sine	Co-sine.	Tangét,	Co-tang.	Sine	Co-sine	Tanget.	Co-tang.	
0	9,609313	9,960730	9,648583	10,351417	9,625948	9,957276	9,668672	10,331327	60
1	9,609597	9,960674	9,648923	10,351077	9,626219	9,957217	9,669002	10,330998	59
2	9,609880	9,960617	9,649263	10,350737	9,626490	9,957158	9,669332	10,330668	58
3	9,610163	9,960561	9,649602	10,350398	9,626760	9,957099	9,669661	10,330339	57
4	9,610446	9 960505	9,649942	10,350058	9,627030	9,957040	9,669990	10,330009	56
5	9,610729	9,960448	9,650281	10,349719	9,627300	9,956981	9,670320	10,329680	55
6	9,611012	9,960392	9,650620	10,349380	9,627570	9,956922	9,670649	10,329351	54
7	9,611294	9,960335	9,650959	10,349041	9,627840	9,956862	9,670977	10,329022	53
8	9,611576	9,960279	9 651297	10,348703	9,628109	9,956803	9,671306	10,328694	52
9	9,611858	9,960222	9,651636	10,348364	9,628378	9,956744	9,671634	10,328365	51
10	9,612140	9,960165	9,651974	10,348026	9,628647	9,956684	9,671963	10,328037	50
11	9,612421	9,960109	9,652312	10,347688	9,628916	9,956625	9,672291	10,327709	49
12	9,612702	9,960052	9,652650	10,347350	9,629184	9,956565	9,672619	10,327381	48
13	9,612983	9,959995	9,652988	10,347012	9,629453	9,956506	9,672947	10,327053	47
14	9 613264	9,959938	9,653326	10,346674	9,629721	9,956446	9,673274	10,326725	46
15	9,613545	9,959881	9,653663	10,346337	9,629989	9 956387	9,673603	10,326398	45
16	9,613825	9,959824	9,654000	10,345999	9,630257	9,956327	9 673929	10,326070	44
17	9,614105	9 959768	9,654337	10,345662	9,630524	9,956267	9,674256	10,325743	43
18	9,614385	9,959710	9,654674	10,345325	9,630792	9,956208	9,674584	10,325416	42
19	9,614665	9,959653	9,655011	10,344989	9,631059	9,956148	9,674910	10,325089	41
20	9,614944	9,959596	9,655348	10,344652	9,631326	9,956088	9,675237	10,324763	40
21	9,615223	9,959539	9,655684	10,344316	9,631592	9,956029	9,675564	10,324436	39
22	9,615502	9,959482	9 656020	10,343980	9,631859	9,955969	9,675890	10,324110	38
23	9,615781	9,959425	9,656356	10,343643	9,632125	9,955909	9,676216	10,323783	37
24	9,616060	9,959367	9,656692	10,343308	9,632392	9,955849	9,676543	10,323457	36
25	9,616338	9,959310	9,657028	10,342972	9,632657	9,955789	9,676869	10,323131	35
26	9,616616	9,959253	9,657363	10,342636	9,632923	9,955739	9,677194	10,322805	34
27	9,616894	9,959195	9,657699	10,342301	9,633189	9,955669	9,677520	10,322480	33
28	9,617172	9,959138	9,658034	10,341966	9,633454	9,955609	9,677845	10,322154	32
29	9,617450	9,959080	9,658369	10,341531	9,633719	9,955548	9,678171	10,321829	31
30	9,617727	9,959023	9,658704	10,341296	9,633984	9 955488	9 678496	10,321504	30
31	9,618004	9,958965	9,659039	10,340926	9,634249	9,955428	9,678821	10 621179	29
32	9,618281	9,958908	9,659373	10,340627	9,634514	9,955367	9,679146	10,320854	28
33	9,618558	9,958850	9,659708	10,340292	9 634778	9,955307	9,679471	10,320529	27
34	9,618834	9,958792	9,660042	10,339958	9,635042	9,955246	9,679795	10,320205	26
35	9,619110	9,958734	9,660376	10,339624	9,635306	9,955186	9,680120	10,316880	25
36	9,619386	9,958677	9,660710	10,339290	9,635570	9,955125	9 680444	10,319556	24
37	9,619662	9,958619	9,661043	10,338957	9,635833	9,955065	9,680768	10,319232	23
38	9,619938	9,958561	9,661377	10,338623	9,636097	9,955004	9,681092	10,318908	22
39	9,620213	9,958503	9,661710	10,338290	9,636360	9,954944	9,681416	10,318584	21
40	9,620488	9,958445	6,662043	10,337956	9,636623	9,954883	9,681740	10,318260	20
41	9 620763	9,958387	9,662376	10,337623	9,636886	9,954823	9,682063	10,317937	19
42	9,621038	9,958329	9 662709	10,337291	9,637148	9,954762	9,682386	10,317613	18
43	9,621313	9,958271	9,663042	10,336958	9,637411	9,954701	9,682710	10,317290	17
44	9,621587	9,958212	9 663374	10,336625	9,637673	9,954640	9,683033	10,316967	16
45	9,621861	9,958154	9,663707	10,336293	9,637935	9 954579	9,683356	10,316644	15
46	9,622135	9,958096	9,664039	10,335961	9,638197	9,954518	9,683678	10,316321	14
47	9,622409	9,958038	9,664371	10,335629	9,638458	9,954457	9,684001	10,315999	13
48	9 622682	9 957979	9,664703	10,335297	9,638720	9,954396	9,684324	10,315676	12
49	9,622956	9,957921	9,665035	10 334965	9,638981	9,954335	9 684646	10,315354	11
50	9,623229	9,957862	9,665366	10,334634	9,639242	9,954274	9,684968	10,315032	10
51	9,623502	9,957804	9,665697	10,334302	9,639503	9,954213	9,685290	10,314710	9
52	9,623774	9,957745	9,666029	10,333971	9,639764	9,954152	9,685612	10,313388	8
53	9,624047	9,957687	9,666360	10,333640	9 640024	9,954090	9,685934	10,314066	7
54	9,624319	9,957628	9,666691	10,333309	9,640284	9,954029	9,686255	10,313745	6
55	9,624591	9,957570	9,667021	10,332979	9,640544	9,954968	9,686577	10,313423	5
56	9,624863	9,957511	9,667352	10,332648	9,640804	9,953906	9,686898	10,313102	4
57	9,625134	9,957452	9,667682	10,332318	9,641064	9,953845	9,687219	10,312781	3
58	9,625406	9,957393	9,668012	10,331987	9,641323	9,953783	9,687540	10,312460	2
59	9,625677	9,957334	9,668343	10,331657	9,641583	9 953722	9,687861	10,312138	1
60	9,625948	9,957276	9,668672	10,331327	9,641842	9,953660	9,688182	10,311818	0
	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
	Degree 65.				Degree 64.				

	Degree 26.				Degree 27				
M	Sine	Co-sine.	Tangent.	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	
0	9,641842	9,953660	9,688182	10,311818	9,657047	9,949880	9,707166	10,292834	60
1	9,642101	9,953598	9,688502	10,311498	9,657295	9,949816	9,707478	10,292523	59
2	9,642360	9,953537	9,688823	10,311177	9,657542	9,949752	9,707790	10,292210	58
3	9,642618	9,953475	9,689143	10,310857	9,657790	9,949687	9,708102	10,291897	57
4	9,642876	9,953413	9,689463	10,310537	9,658037	9,949623	9,708414	10,291586	56
5	9,643135	9,953351	9,689783	10,310217	9,658284	9,949598	9,708726	10,291274	55
6	9,643393	9,953290	9,690103	10,309897	9,658531	9,949494	9,709037	10,290962	54
7	9,643650	9,953228	9,690423	10,309577	9,658777	9,949429	9,709349	10,290651	53
8	9,643908	9,953166	9,690742	11,309258	9,659024	9,949364	9,709660	10,290340	52
9	9,644165	9,953104	9,691063	10,308938	9,659271	9,949300	9,709971	10,290029	51
10	9,644423	9,953042	9,691381	10,308619	9,659517	9,949235	9,710282	10,289718	50
11	9,644680	9,952980	9,691700	10,308300	9,659763	9,949170	9,710593	10,289407	49
12	9,644936	9,952917	9,692019	10,307981	9,660009	9,949105	9,710904	10,289096	48
13	9,645193	9,952855	9,692338	10,307662	9,660255	9,949040	9,711214	10,288785	47
14	9,645449	9,952793	9,692656	10,307343	9,660500	9,948976	9,711525	10,288475	46
15	9,645706	9,952731	9,692975	10,307025	9,660746	9,948910	9,711836	10,288164	45
16	9,645962	9,952668	9,693293	10,306706	9,660991	9,948845	9,712146	10,287854	44
17	9,646218	9,952606	9,693612	10,306388	9,661236	9,948780	9,712456	10,247544	43
18	9,646473	9,952544	9,693930	10,306070	9,661481	9,948715	9,712766	10,287234	42
19	9,646729	9,952481	9,694248	10,305752	9,661726	9,948650	9,713076	10,286924	41
20	9,646984	9,952419	9,694566	10,305434	9,661970	9,948584	9,713386	10,286614	40
21	9,647239	9,952356	9,694883	10,305117	9,662214	9,948519	9,713695	10,286305	39
22	9,647494	9,952294	9,695201	10,304799	9,662459	9,948453	9,714005	10,285995	38
23	9,647749	9,952231	9,695518	10,304482	9,662702	9,948388	9,714314	10,285686	37
24	9,648004	9,952168	9,695835	10,304164	9,662947	9,948323	9,714624	10,285376	36
25	9,648258	9,952105	9,696153	10,303847	9,663190	9,948257	9,714933	10,285067	35
26	9,648512	9,952043	9,696470	10,303530	9,663433	9,948191	9,715241	10,284758	34
27	9,648766	9,951980	9,696786	10,303213	9,663677	9,948126	9,715550	10,284449	33
28	9,649020	9,951917	9,697103	10,302897	9,663920	9,948060	9,715859	10,284140	32
29	9,649274	9,951854	9,697420	10,302580	9,664163	9,947995	9,716168	10,283832	31
30	9,649527	9,951791	9,697738	10,302264	9,664406	9,947929	9,716477	10,283523	30
31	9,649781	9,951728	9,698052	10,301947	9,664648	9,947863	9,716785	10,283215	29
32	9,650034	9,951665	9,698369	10,301631	9,664891	9,947797	9,717093	10,282907	28
33	9,650287	9,951602	9,698685	10,301315	9,665133	9,947731	9,717401	10,282598	27
34	9,650519	9,951539	9,699001	10,300999	9,665375	9,947665	9,717709	10,282290	26
35	9,650793	9,951476	9,699316	10,300684	9,665617	9,947599	9,718017	10,281983	25
36	9,651044	9,951412	9,699632	10,300368	9,665858	9,947533	9,718325	10,281675	24
37	9,651296	9,951349	9,699947	10,300052	9,666100	9,947467	9,718633	10,281367	23
38	9,651648	9,951286	9,700263	10,299737	9,666341	9,947401	9,718940	10,281060	22
39	9,651800	9,951222	9,700578	10,299422	9,666583	9,947335	9,719248	10,280752	21
40	9,652052	9,951159	9,700893	10,299107	9,666824	9,947269	9,719555	10,280445	20
41	9,652303	9,951095	9,701208	10,298792	9,667065	9,947203	9,719862	10,280138	19
42	9,652555	9,951032	9,701522	10,298477	9,667305	9,947136	9,720169	10,279831	18
43	9,652806	9,950968	9,701837	10,298163	9,667546	9,947070	9,720476	10,279524	17
44	9,653057	9,950905	9,702152	10,297848	9,667786	9,947004	9,720783	10,279217	16
45	9,653307	9,950841	9,702466	10,297534	9,668026	9,946937	9,721089	10,278911	15
46	9,653558	9,950777	9,702780	10,297219	9,668266	9,946871	9,721395	10,278604	14
47	9,653808	9,950714	9,703095	10,296905	9,668506	9,946804	9,721702	10,278298	13
48	9,654059	9,950650	9,703409	10,296591	9,668746	9,946738	9,722008	10,277991	12
49	9,654309	9,950586	9,703722	10,296277	9,668986	9,946671	9,722315	10,277685	11
50	9,654558	9,950522	9,704036	10,295964	9,669225	9,946604	9,722621	10,277379	10
51	9,654808	9,950458	9,704350	10,295650	9,669464	9,946537	9,722927	10,277073	9
52	9,655057	9,950394	9,704663	10,295337	9,669703	9,946471	9,723232	10,276768	8
53	9,655307	9,950330	9,704976	10,295023	9,669942	9,946404	9,723538	10,276462	7
54	9,655556	9,950266	9,705290	10,294710	9,670181	9,946337	9,723843	10,276156	6
55	9,655805	9,950202	9,705603	10,294397	9,670419	9,946270	9,724149	10,275851	5
56	9,656053	9,950138	9,705915	10,294084	9,670657	9,946203	9,724454	10,275546	4
57	9,656302	9,950074	9,706228	10,293771	9,670896	9,946136	9,724759	10,275240	3
58	9,656550	9,950009	9,706541	10,293459	9,671134	9,946469	9,725065	10,274935	2
59	9,656799	9,949945	9,706853	10,293146	9,671372	9,946001	9,725369	10,274630	1
60	9,656347	9,949881	9,707166	10,292824	9,671609	9,945935	9,725674	10,274326	0
	Co-sine.	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent.	M
	Degree 63.				Degree 62.				

	Degree 28.				Degree 29				
M	Sine	Co-sine.	Tangent.	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	M
0	9,671609	9,945935	9,725674	10,274326	9,685571	9,941819	9,743752	10,256248	60
1	9,671847	9,945868	9,725979	10,274021	9,685799	9,941749	9,744050	10,255950	59
2	9,672084	9,945800	9,726284	10,273816	9,686027	9,941679	9,744348	10,255652	58
3	9,672321	9,945733	9,726588	10,273412	9,686254	9,941609	9,744645	10,255355	57
4	9,672558	9,945666	9,726892	10,273107	9,686482	9,941539	9,744943	10,255057	56
5	9,672795	9,945598	9,727197	10,272803	9,686709	9,941468	9,745240	10,254760	55
6	9,673032	9,945531	9,727501	10,272499	9,686936	9,941398	9,745538	10,254462	54
7	9,673268	9,945463	9,727805	10,272195	9,687163	9,941328	9,745835	10,254165	53
8	9,673505	9,945396	9,728109	10,271891	9,687389	9,941257	9,746132	10,253868	52
9	9,673741	9,945328	9,728412	10,271587	9,687616	9,941187	9,746429	10,253571	51
10	9,673977	9,945261	9,728716	10,271284	9,687842	9,941116	9,746726	10,253274	50
11	9,674213	9,945193	9,729020	10,270980	9,688069	9,941046	9,747023	10,252977	49
12	9,674448	9,945125	9,729323	10,270677	9,688295	9,940975	9,747319	10,252680	48
13	9,674684	9,945058	9,729626	10,270374	9,688523	9,940905	9,747616	10,252384	47
14	9,674919	9,944990	9,729929	10,270070	9,688747	9,940834	9,747912	10,252087	46
15	9,675154	9,944922	9,730232	10,269767	9,688972	9,940763	9,748209	10,251791	45
16	9,675389	9,944854	9,730535	10,269464	9,689198	9,940693	9,748505	10,251495	44
17	9,675623	9,944786	9,730838	10,269162	9,689421	9,940622	9,748801	10,251199	43
18	9,675859	9,944718	9,731141	10,268859	9,689648	9,940551	9,749097	10,250902	42
19	9,676094	9,944650	9,731443	10,268556	9,689873	9,940480	9,749393	10,250607	41
20	9,676328	9,944582	9,731746	10,268254	9,690098	9,940409	9,749689	10,250311	40
21	9,676562	9,944514	9,732048	10,267952	9,690323	9,940338	9,749985	10,250015	39
22	9,676796	9,944446	9,732351	10,267649	9,690548	9,940267	9,750281	10,249719	38
23	9,677030	9,944377	9,732653	10,267347	9,690772	9,940196	9,750576	10,249424	37
24	9,677264	9,944309	9,732955	10,267045	9,690996	9,940125	9,750872	10,249128	36
25	9,677497	9,944241	9,733257	10,266743	9,691220	9,940053	9,751167	10,248833	35
26	9,677731	9,944172	9,733558	10,266441	9,691444	9,939982	9,751462	10,248538	34
27	9,677964	9,944104	9,733860	10,266140	9,691668	9,939911	9,751757	10,248243	33
28	9,678197	9,944016	9,734162	10,265838	9,691892	9,939840	9,752052	10,247948	32
29	9,678430	9,943967	9,734463	10,265537	9,692115	9,939768	9,752347	10,247653	31
30	9,678663	9,943898	9,734764	10,265236	9,692339	9,939697	9,752642	10,247358	30
31	9,678895	9,943830	9,735666	10,264934	9,692562	9,939625	9,752937	10,247063	29
32	9,679128	9,943761	9,735362	10,264633	9,692785	9,939554	9,753231	10,246769	28
33	9,670360	9,943692	9,735668	10,264332	9,693008	9,939482	9,753526	10,246474	27
34	9,679592	9,943624	9,735968	10,264031	9,693231	9,939410	9,753820	10,246180	26
35	9,679824	9,943555	9,736269	10,263731	9,693453	9,939339	9,754115	10,245885	25
36	9,680056	9,943486	9,736570	10,263430	9,693676	9,939267	9,754409	10,245591	24
37	9,680288	9,943417	9,736870	10,263130	9,693898	9,939195	9,754703	10,245297	23
38	9,680519	9,943348	9,737171	10,262829	9,694120	9,939123	9,754997	10,245003	22
39	9,680750	9,943279	9,737471	10,262529	9,694342	9,939051	9,755291	10,244709	21
40	9,680982	9,943210	9,737771	10,262229	9,694564	9,938980	9,755584	10,244415	20
41	9,681213	9,943141	9,738071	10,261929	9,694786	9,938908	9,755878	10,244122	19
42	9,681443	9,943072	9,738371	10,261629	9,695007	9,938835	9,756172	10,243828	18
43	9,681674	9,943003	9,738671	10,261329	9,695229	9,938763	9,756465	10,243535	17
44	9,681904	9,942933	9,738971	10,261029	9,695450	9,938691	9,756759	10,243241	16
45	9,682135	9,942864	9,739271	10,260729	9,695671	9,938619	9,757052	10,242948	15
46	9,682365	9,942795	9,739570	10,260430	9,695892	9,938547	9,757345	10,242655	14
47	9,682595	9,942725	9,739870	10,260130	9,696113	9,938475	9,757638	10,242362	13
48	9,682825	9,942656	9,740169	10,259831	9,696334	9,938402	9,757931	10,242069	12
49	9,683055	9,942587	9,740468	10,259532	9,696554	9,938330	9,758224	10,241776	11
50	9,683284	9,942517	9,740767	10,259233	9,696774	9,938257	9,758517	10,241483	10
51	9,583514	9,942448	9,741066	10,258934	9,696995	9,938185	9,758810	10,241190	9
52	9,683743	9,942378	9,741365	10,258635	9,697215	9,938112	9,759102	10,240898	8
53	9,683972	9,942308	9,741664	10,258336	9,697435	9,938040	9,759395	10,240605	7
54	9,684201	9,942239	9,741962	10,258038	9,697654	9,937967	9,759687	10,240313	6
55	9,684430	9,942169	9,742261	10,257739	9,697874	9,937895	9,759979	10,240021	5
56	9,684658	9,942099	9,742559	10,257441	9,698093	9,937822	9,760271	10,239728	4
57	9,684887	9,942029	9,742858	10,257142	9,698313	9,937749	9,760564	10,239436	3
58	9,685115	9,941059	9,743156	10,256844	9,698532	9,937676	9,760856	10,239144	2
59	9,685343	9,941889	9,743454	10,256546	9,698751	9,937603	9,761147	10,238852	1
60	9,685571	9,941819	9,743751	10,256248	9,698970	9,937531	9,761439	10,238561	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent.	M
	Degree 61.				Degree 60.				

	Degree 30.				Degree 31				
M	Sine	*Co-sine.*	Tanget.	*Co-tang.*	Sine	*Co-sine*	Tanget.	*Co-tang.*	
0	9,698970	9,937531	9,761439	10,238561	9,711839	9,933066	9,778774	10,221226	60
1	9,699189	9,937458	9,761731	10,238269	9,712049	9,932990	9,779060	10,220940	59
2	9,699407	9,937385	9,762023	10,237977	9,712259	9,932914	9,779346	10,220654	58
3	9,699626	9,937312	9,762314	10,237686	9,712469	9,932838	9,779632	10,220368	57
4	9,699844	9,937238	9,762606	10,237394	9,712679	9,932761	9,779918	10,220082	56
5	9,700062	9,937165	9,762897	10,237103	9,712889	9,932685	9,780203	10,219796	55
6	9,700280	9,937092	9,763188	10,236812	9,713098	9,932609	9,780489	10,219511	54
7	9,700498	9,937019	9,763479	10,236521	9,713308	9,932533	9,780775	10,219225	53
8	9,700716	9,936945	9,763770	10,236230	9,713517	9,932457	9,781060	10,218940	52
9	9,700933	9,936872	9,764061	10,235939	9,713726	9,932380	9,781346	10,218654	51
10	9,701151	9,936799	9,764352	10,235648	9,713935	9,932304	9,781631	10,218369	50
11	9,701568	9,936725	9,764643	10,235357	9,714144	9,932227	9,781916	10,218084	49
12	9,701585	9,936652	9,764933	10,235067	9,724352	9,932151	9,782202	10,217799	48
13	9,701822	9,936578	9,765224	10,234776	9,714561	9,932074	9,782486	10,217514	47
14	9,702019	9,936505	9,765514	10,234486	9,714769	9,931998	9,782771	10,217229	46
15	9,702236	9,936431	9,765805	10,234195	9,714977	9,931921	9,783056	10,216944	45
16	9,702452	9,936357	9,766095	10,233905	9,715186	9,931845	9,783341	10,216659	44
17	9,702669	9,936284	9,766385	10,233615	9,715394	9,931768	9,783626	10,216374	43
18	9,702885	9,936210	9,766675	10,233325	9,715601	9,931691	9,783910	10,216090	42
19	9,703101	9,936136	9,766965	10,233035	9,715809	9,931614	9,784195	10,215805	41
20	9,703317	9,936062	9,767255	10,232745	9,716017	9,931537	9,784479	10,215520	40
21	9,703533	9,935988	9,767545	10,232455	9,716224	9,931460	9,784764	10,215236	39
22	9,703748	9,935914	9,767834	10,232166	9,716431	9,931383	9,785048	10,214952	38
23	9,703964	9,935840	9,768124	10,231876	9,716639	9,931306	9,785332	10,214668	37
24	9,704179	9,935766	9,768413	10,231587	9,716846	9,931229	9,785616	10,214384	36
25	9,704395	9,935692	9,768703	10,231297	9,717053	9,931152	9,785900	10,214099	35
26	9,704610	9,935618	9,768992	10,231008	9,717259	9,931075	9,786184	10,213816	34
27	9,704825	9,935543	9,769281	10,230719	9,717466	9,930998	9,786468	10,213532	33
28	9,705040	9,935469	9,769570	12,230430	9,717672	9,930920	9,786752	10,213248	32
29	9,705254	9,935395	9,769859	10,230141	9,717879	9,930843	9,787036	10,212964	31
30	9,005469	9,935320	9,770148	10,229852	9,718085	9,930766	9,787319	10,212681	30
31	9,705683	9,935246	9,770437	10,229563	9,718291	9,930688	9,787603	10,212397	29
32	9,705897	9,935171	9,770726	10,229274	9,718497	9,930611	9,787886	10,212114	28
33	9,706112	9,935097	9,771015	10,228985	9,718703	9,930533	9,788170	10,211830	27
34	9,706326	9,935022	9,771303	10,228697	9,718909	9,930456	9,788453	10,211547	26
35	9,706539	9,934948	9,771592	10,228408	9,719114	9,930378	9,788736	10,211264	25
36	9,706753	9,934873	9,771880	10,228120	9,719320	9,930300	9,789019	10,210981	24
37	9,706967	9,934798	9,772168	10,227832	9,719525	9,930223	9,789302	10,210698	23
38	9,707180	9,934723	9,772456	10,227543	9,719730	9,930145	9,789585	10,210415	22
39	9,707393	9,934649	9,772745	10,227255	9,719935	9,930067	9,789868	10,210132	21
40	9,707606	9,934574	9,773033	10,226967	9,720140	9,929989	9,790151	10,209849	20
41	9,707819	9,934499	9,773321	10,226679	9,720345	9,929911	9,790433	10,209566	19
42	9,708032	9,934424	9,773608	10,226391	9,720549	9,929833	9,790716	10,209284	18
43	9,708245	9,934349	9,773896	19,226104	9,720754	9,929755	9,790999	10,209001	17
44	9,708457	9,934274	9,774184	10,225816	9,720958	9,929677	9,790281	10,208719	16
45	9,708670	9,934199	9,774471	10,225529	9,721162	9,929599	9,791563	10,208436	15
46	9,708882	9,934123	9,774759	10,225241	9,721366	9,929521	9,791846	10,208154	14
47	9,709094	9,934048	9,775046	10,224954	9,721570	9,929442	9,792128	10,207872	13
48	9,709306	9,933973	9,775333	10,224666	9,721774	9,929364	9,792410	10,207590	12
49	9,709518	9,933897	9,775621	10,224379	9,721978	9,929286	9,792692	10,207308	11
50	9,709730	9,933822	9,775908	10,224092	9,722181	9,929207	9,792974	10,207024	10
51	9,709941	9,933747	9,776195	10,223805	9,722385	9,929129	9,793256	10,206744	9
52	9,710153	9,933671	9,776482	10,223518	9,722588	9,929050	9,793538	10,206462	8
53	9,710364	9,933596	9,776768	10,223232	9,722791	9,928972	9,793819	10,206180	7
54	9,710575	9,933520	9,777055	10,222945	9,722994	9,928893	9,794101	10,205879	6
55	9,710786	9,933444	9,777342	10,222658	9,723197	9,928814	9,794383	10,205617	5
56	9,710997	9,933369	9,777628	10,222372	9,723400	9,928736	9,794664	10,205336	4
57	9,711208	9,933293	9,777915	10,222085	9,723603	9,928657	9,794945	10,205054	3
58	9,711418	9,933217	9,778201	10,221799	9,723805	9,928578	9,795227	10,204773	2
59	9,711629	9,933141	9,778487	10,221513	9,724007	9,928499	9,795508	10,204492	1
60	9,711839	9,933066	9,778774	10,221226	9,724210	9,928420	9,795789	10,204211	0
	Co-sine	Sine	*Co-tang.*	Tangent.	*Co-sine*	Sine	*Co-tang.*	Tangent	M
	Degree 59.				Degree 58.				

Degree 32.

M	Sine	Co-sine	Tanget	Co-tang	
0	9,724210	9,928420	9,795789	10,204211	60
1	9,724412	9,928341	9,796070	10,203930	59
2	9,724614	9,928262	9,796351	10,203649	58
3	9,724816	9,928183	9,796632	10,203368	57
4	9,725017	9,928104	9,796913	10,203087	56
5	9,725219	9,928025	9,797194	10,202806	55
6	9,725420	9,927946	9,797474	10,202522	54
7	9,725622	9,921867	9,797755	10,202245	53
8	9,725823	9,927787	9,798036	10,201964	52
9	9,726024	9,927708	9,798316	10,201684	51
10	9,726225	9 927628	9,798596	10,201404	50
11	9,726426	9,927549	9,798877	10,201123	49
12	9,726626	9,927469	9,799157	10,200843	48
13	9,726827	9,927390	9,799437	10,200563	47
14	9,727027	9,927310	9,799717	10,200283	46
15	9,727228	9,927231	9,799997	10,200003	45
16	9,727428	9,927151	9,800277	10,199723	44
17	9,727628	9,927071	9,800557	10,199443	43
18	9,727828	9,926991	9,800836	10,199163	42
19	9,728027	9,926911	9,801116	10,198884	41
20	9,728227	9,926831	9,801396	10,198604	40
21	9,728427	9,926751	9,801675	10,198325	39
22	9,728626	9,926671	9,801955	10,198045	38
23	9,728825	9,926591	9,802234	10,197766	37
24	9,729024	9,926511	9,802513	10,197487	36
25	9,729223	9,926431	9,802792	10,197207	35
26	9,729422	9,926351	9,803072	10,196928	34
27	9,729621	9,926270	9,803351	10,196649	33
28	9,729820	9,926190	9,803630	10,196370	32
29	9,730018	9,926110	9,803908	10,196091	31
30	9,730216	9,926029	9,804187	10,195813	30
31	9,730415	9,925949	9,804466	10,195534	29
32	9,730613	9,925868	9,804745	10,195255	28
33	9,730811	9,925787	9,805023	10,194977	27
34	9,731009	9,925707	9,805302	10,194698	26
35	9,731206	9,925626	9,805580	10,194420	25
36	9,731404	9,925545	9,805859	10,194141	24
37	9,731601	9,925464	9,806137	10,193863	23
38	9,731799	9,925384	9,806415	10,193585	22
39	9,731996	9,925303	9,806693	10,193309	21
40	9,732193	9,925222	9,806971	10,193028	20
41	9,732390	9,925141	9,807249	10,192751	19
42	9,732587	9,925060	9,807527	10,192433	18
43	9,732784	9,924978	9,807805	10,192195	17
44	9,732980	9 924897	9 808083	10,191917	16
45	9,733177	9,924816	9,808361	10,191639	15
46	9,733373	9,924735	9,808638	10,191362	14
47	9,733569	9,924653	9 808916	10,191084	13
48	9,733765	9,924572	9,809193	10,190807	12
49	9 733961	9,924491	9,809471	10,190529	11
50	9,734157	9 924409	9,809748	10,190252	10
51	9,734353	9,924328	9,810025	10,189975	9
52	9 734548	9,924246	9,810302	10,189697	8
53	9,734744	9 924164	9,810580	10,189420	7
54	9,734939	9 924083	9,810857	10,189143	6
55	9,735134	9,924001	9,811134	10,188866	5
56	9,735330	9,923919	9,811410	10,188589	4
57	9,735525	9,923837	9 811687	10,188313	3
58	9,735719	9,923755	9,811964	10,188036	2
59	9,735914	9,923673	9,812241	10,187759	1
60	9,736109	9,923591	9,812517	10,187483	0
	Co-sine	Sine	Co-tang.	Tangent	M

Degree 57.

Degree 33.

M	Sine	Co-sine	Tanget.	Co-tang.	
0	9,736109	9,923591	9,812517	10,187483	60
1	9,736309	9,923509	9,812794	10,187206	59
2	9,736497	9,923427	9,813070	10,186930	58
3	9,736692	9,923345	9,813347	10,186653	57
4	9,736886	9,923263	9,813623	10,186377	56
5	9,737080	9,923180	9,813899	10,186101	55
6	9,737274	9,923098	9 814175	10,185824	54
7	9,737467	9,923016	9,814452	10,185548	53
8	9,737661	9,922933	9 814728	10,185272	52
9	9,737854	9,922851	9,815004	10,184996	51
10	9,738048	9,922768	9,815279	10,184720	50
11	9,738241	9,922686	9,815555	10,184445	49
12	9,738434	9,922603	9,815831	10,184169	48
13	9,738627	9,922520	9,816107	10,183893	47
14	9,738820	9,922438	9,816382	10,183617	46
15	9,739013	9,922355	9,816658	10,183342	45
16	9,739205	9 922272	9,816933	10,183066	44
17	9,739398	9,922189	9,817209	10,182791	43
18	9,739590	9,922106	9,817484	10,182516	42
19	9,739783	9,922023	9,817759	10,182240	41
20	9,739975	9,921940	9,818035	10,181965	40
21	9,740167	9,921857	9,818310	10,181690	39
22	9 740359	9,921774	9,818585	10,181415	38
23	9,740550	9,921691	9,818860	10,181140	37
24	9,740742	9,921607	9,819135	10,180865	36
25	9,740934	9 921524	9,819410	16,180590	35
26	9,741125	9,921441	9,819684	10,180315	34
27	9,741316	9,921357	9,819959	10,180041	33
28	9,741507	9 921274	9,820234	10,179766	32
29	9,741698	9,921190	9,820508	10,179492	31
30	9,741889	9,921107	9 820783	10,179217	30
31	9,742080	9,921023	9,821057	10,178943	29
32	9,742271	9,920939	9,821332	10,178668	28
33	9,742461	9,920855	9,821606	10,178394	27
34	9,742652	9,920772	9,821880	10,178120	26
35	9,742842	9,920688	9 822154	10,177846	25
36	9,743032	9,920604	9,822429	10,177571	24
37	9,743223	9,920520	9 822703	10,177297	23
38	9,743412	9,920436	9,822977	10,177023	22
39	9,743602	9,920352	9,823250	10,176739	21
40	9,743792	9,920268	9,823524	10,176476	20
41	9,743982	9,920184	9,823798	10,176202	19
42	[illegible]44171	9,920099	9,824072	10,175928	18
43	9,744361	9,920015	9,824345	10 175655	17
44	9,744550	9,919931	9,824619	10,175381	16
45	9,744739	9.919846	9,824892	10,175108	15
46	9,744928	9,919762	9 825166	10,174834	14
47	9,745117	9,919677	9,825439	10,174560	13
48	9,745306	9,919593	9,825713	10,174287	12
49	9,745494	9,9195[illegible]8	9 825986	10,174014	11
50	9,745683	9,919424	9,826259	10,173741	10
51	9,745871	9,919339	9,826532	10,173468	9
52	9,746059	9.919254	9,826805	10,173195	8
53	9,746248	9,919169	9,827078	10,172922	7
54	9,746436	9,919084	9,827351	10,172649	6
55	9,746624	9,918999	9,827624	10,172376	5
56	9,746811	9 918915	9,827897	10,172103	4
57	9,746999	9,918830	9,828170	10,171830	3
58	9,747187	9,918744	9,828442	10,171558	2
59	9,747374	9,918659	9,828715	10,171285	1
60	9 747562	9,918574	9 828987	10,171013	0
	Co-sine	Sine	Co-tang.	Tangent	M

Degree 56.

	Degree 34.				Degree 35				
M	Sine	Co-sine.	Tangent.	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	
0	9,747562	9,918574	9,828987	10,171012	9,758591	9,913364	9,845227	10,154774	60
1	9,747749	9,918489	9,829260	10,170740	9,758772	9,913276	9,845496	10,154504	59
2	9,747936	9,918404	9,829532	10,170468	9,758952	9,913187	9,845764	10,154235	58
3	9,748123	9,918318	9,829805	10,170195	9,759132	9,913099	9,846033	10,153967	57
4	9,748310	9,918233	9,830077	10,169923	9,759312	9,913010	9,846302	10,153698	56
5	9,748497	9,918147	9,830349	10,169651	9,759492	9,912921	9,846570	10,153429	55
6	9,748683	9,918062	9,830621	10,169379	9,759672	9,912833	9,846839	10,153161	54
7	9,748870	9,917976	9,830893	10,169106	9,759851	9,912744	9,847107	10,152892	53
8	9,749056	9,917891	9,831165	10,168834	9,760031	9,912655	9,847376	10,152624	52
9	9,749242	9,917805	9,831437	10,168563	9,760210	9,912566	9,847644	10,152356	51
10	9,749429	9,917719	9,831709	10,168291	9,760390	9,912477	9,847913	10,152087	50
11	9,749615	9,917634	9,831981	10,168019	9,760569	9,912388	9,848181	10,151819	49
12	9,749801	9,917548	9,832253	10,167747	9,760748	9,912299	9,848449	10,151551	48
13	9,749986	9,917462	9,832525	10,167475	9,760927	9,912210	9,848717	10,151283	47
14	9,750172	9,917376	9,832796	10,167204	9,761106	9,912121	9,848985	10,151015	46
15	9,750358	9,917290	9,833068	10,166932	9,761285	9,912031	9,849254	10,150746	45
16	9,750543	9,917204	9,833339	10,166660	9,761464	9,911942	9,849522	10,150478	44
17	9,750729	9,917118	9,833611	10,166389	9,761642	9,911853	9,849789	10,150214	43
18	9,750914	9,917032	9,833882	10,166118	9,761821	9,911763	9,850057	10,149943	42
19	9,751099	9,916945	9,834154	10,165846	9,761999	9,911674	9,850325	10,149675	41
20	9,751284	9,916859	9,834425	10,165575	9,762177	9,911584	9,850593	10,149407	40
21	9,751469	9,916773	9,834696	10,165304	9,762356	9,911495	9,850861	10,149139	39
22	9,751654	9,916686	9,834967	16,165033	9,762534	9,911405	9,851128	10,148872	38
23	9,751838	9,916600	9,835238	10,164762	9,762712	9,911315	9,851396	10,148604	37
24	9,752023	9,916514	9,835509	10,164491	9,762889	9,911226	9,851664	10,148336	36
25	9,752207	9,916427	9,835780	10,164220	9,763067	9,911136	9,851931	10,148059	35
26	9,752392	9,916340	9,836051	10 163949	9,763245	9,911046	9,852199	10,147801	34
27	9,752576	9,916254	9,836322	10,163678	9,763422	9,910956	9,852466	10,147534	33
28	9,752760	9,916167	9,836593	10,163407	9 763599	9,910866	9,852731	10,147267	32
29	9,752944	9,916080	9,836864	10,163156	9,763777	9,910776	9,853001	10,146999	31
30	9,753128	9,915994	9,837134	10,162866	9,763954	9,910686	9,853268	10,146732	30
31	9,753312	9,915907	9,837405	10,162595	9,764131	9,910596	9,853532	10,146465	29
32	9,753495	9,915820	9,837675	10,162325	9,764308	9,910506	9,853802	10,146198	28
33	9,753679	9,915733	9,837946	10,162054	9 764485	9,910415	9,854069	10 145930	27
34	9,753862	9,915646	9,838216	10,161784	9,764662	9,910325	9,854336	10,145664	26
35	9,754046	9,915559	9,838487	10,161513	9,764838	9,910235	9,854603	10,145397	25
36	9,754229	9,915472	9,838757	10,161243	9,765015	9,910144	9,854870	10,145130	24
37	9,754412	9,915385	9,839027	10,160973	9,765191	9,910054	9,855137	10,144863	23
38	9,754595	9,915297	9,839297	10,160702	9,765367	9,909963	9,855404	10,144596	22
39	9,754778	9,915210	9,839568	10,160432	9,765544	9,909873	9,855671	10,144329	21
40	9,754960	9,915123	9,839838	10,160162	9,765720	9,909782	9,855937	10,144063	20
41	9,755143	9,915035	9,840108	10,159892	9,765896	9,909691	9,856204	10,143796	19
42	9,755325	9 914948	9,840378	10,159622	9,766071	9,909601	9,856471	10,143529	18
43	9,755508	9,914860	9,840647	10,159352	9,766247	9,909510	9,856737	10,143263	17
44	9 755690	9,914773	9,840917	10,159083	9,766423	9,909419	9,857004	10,142996	16
45	9,755872	9,914685	8,841187	10,158813	9 766598	9,909328	9 857270	10,142730	15
46	9,756054	9,914597	9,841457	10,158543	9,766774	9,909237	9,857537	10,142463	14
47	9,756236	9,914510	9,841726	10,158273	9,766949	9,909146	9,857803	10,142197	13
48	9,756418	9,914422	9,841996	10,158004	9,767124	9,909055	9,858069	10,141931	12
49	9,756600	9,914334	9,842266	10,157734	9,767299	9,908964	9,858336	10,141664	11
50	9,756781	9,914246	9,842535	10,157465	9,767474	9,908873	9,858602	10,141398	10
51	9,756963	9,914158	9,842804	10,157195	9,767649	9,908781	9,858868	10,141132	9
52	9,757144	9 914070	9,843074	10,156926	9,767824	9,908690	9,859134	10,140866	8
53	9,757326	9,913982	9,843343	10,156657	9,767997	9,908599	9,859400	10,140600	7
54	9,757507	9,913894	9,843612	10,156387	9,768173	9,908507	9,859666	10,140334	6
55	9,757688	9,913806	9,843882	10,156118	9,768348	9,908416	9 859932	10,140068	5
56	9,757869	9,913718	9,844151	10,155849	9 768522	9,908324	9,860198	10,139802	4
57	9,758049	9,913630	9,844420	10,155580	9,768696	9,908233	9,860464	10,139536	3
58	9,758230	9,913541	9,844689	10,155311	9,768871	9,908141	9 860730	10,139270	2
59	9,758411	9,913453	9 844958	10,155042	9,769045	9,908049	9,860995	10,139005	1
60	9,758591	9,913364	9,845227	10,154773	9 769219	9,907958	9,861261	10,138739	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent,	M
	Degree 55.				Degree 54.				

	Degree 36.				Degree 37.				
M	Sine	Co-sine	Tanget,	Co-tang.	Sine	Co-sine	Tanget.	Co-tang.	
0	9,769219	9,907958	9,861261	10,138739	9,779463	9,902349	9,877114	10,122885	60
1	9,769392	9,907866	9,861527	10,138473	9,779631	9,902253	9,877377	10,122623	59
2	9,769566	9,907774	9,861792	10,138208	9,779798	9,902158	9,877640	10,122360	58
3	9,769740	9,907682	9,862058	10,137942	9,779965	9,902063	9,877903	10,122097	57
4	9,769913	9,907590	9,862323	10,137677	9,780133	9,901967	9,878165	10,121834	56
5	9,770087	9,907498	9,862589	10,137411	9,780300	9,901872	9,878428	10,121572	55
6	9,770260	9,907406	9,862854	10,137146	9,780467	9,901776	9,878691	10,121309	54
7	9,770433	9,907314	9,863119	10,136880	9,780634	9,901681	9,878953	10,121047	53
8	9,770606	9,907221	9,863385	10,136615	9,780801	9,901585	9,879216	10,120784	52
9	9,770779	9,907129	9,863650	10,136350	9,780968	9,901488	9,879478	10,120522	51
10	9,770952	9,907037	9,863915	10,136085	9,781134	9,901391	9,879741	10,120259	50
11	9,771125	9,906945	9,864180	10,135820	9,781301	9,901298	9,880003	10,119997	49
12	9,771298	9,906852	9,864445	10,135554	9,781467	9,901202	9,880265	10,119734	48
13	9,771470	9,906760	9,864710	10,135289	9,781634	9,901106	9,880528	10,119472	47
14	9,771643	9,906667	9,864975	10,135024	9,781800	9,901010	9,880790	10,119210	46
15	9,771815	9,906574	9,865240	10,134759	9,781966	9,900914	9,881052	10,118948	45
16	9,771987	9,906482	9,865505	10,134495	9,782132	9,900828	9,881314	10,118686	44
17	9,772159	9,906389	9,865770	10,134230	9,782298	9,900722	9,881576	10,118424	43
18	9,772331	9,906296	9,866035	10,133965	9,782464	9,900626	9,881839	10,118161	42
19	9,772503	9,906203	9,866300	10,133700	9,782690	9,900529	9,882101	10,117899	41
20	9,772675	9,906111	9,866564	10,133436	9,782796	9,900433	9,882363	10,117637	40
21	9,772847	9,906018	9,866829	10,133171	9,782961	9,900337	9,882625	10,117375	39
22	9,773018	9,905925	9,867094	10,132906	9,783127	9,900240	9,882886	10,117114	38
23	9,773190	9,905832	9,867358	10,132642	9,783292	9,900144	9,883148	10,116852	37
24	9,773361	9,905738	9,867623	10,132377	9,783457	9,900047	9,883410	10,116590	36
25	9,773533	9,905645	9,867887	10,132113	9,783623	9,899951	9,883672	10,116328	35
26	9,773704	9,905552	9,868152	10,131848	9,783788	9,899854	9,883934	10,116066	34
27	9,773875	9,905459	9,868416	10,131584	9,783953	9,899757	9,884195	10,115805	33
28	9,774046	9,905365	9,868680	10,131320	9,784118	9,899660	9,884457	10,115543	32
29	9,774217	9,905272	9,868945	10,131055	9,784282	9,899563	9,884719	10,115281	31
30	9,774388	9,905179	9,869209	10,130791	9,784447	9,899467	9,884980	10,115020	30
31	9,774558	9,905085	9,864773	10,130527	9,784616	9,899370	9,885241	10,114758	29
32	9,774729	9,904992	9,867337	10,130263	9,784776	9,899273	9,885503	10,114497	28
33	9,774899	9,904898	9,870001	10,129999	9,784941	9,899175	9,885765	10,114235	27
34	9,775070	9,904804	9,870265	10,129735	9,785105	9,899078	9,886026	10,113974	26
35	9,775240	9,904711	9,870529	10,129471	9,785269	9,898981	9,886288	10,113712	25
36	9,775410	9,904617	9,870793	10,129207	9,785433	9,898884	9,886549	10,113451	24
37	9,775580	9,904523	9,871057	10,128943	9,785591	9,898787	9,886810	10,113190	23
38	9,775750	9,904429	9,871321	10,128679	9,785761	9,898689	9,887072	10,112928	22
39	9,775920	9,904335	9,871585	10,128415	9,785925	9,898592	9,887333	10,112667	21
40	9,776090	9,904241	9,871849	10,128151	9,786088	9,898494	9,887594	10,112406	20
41	9,776259	9,904147	9,872112	10,127888	9,786252	9,898397	9,887855	10,112145	19
42	9,776429	9,904053	9,872376	10,127624	9,786416	9,898299	9,888116	10,111884	18
43	9,776598	9,903959	9,872640	10,127360	9,786579	9,898201	9,888377	10,111623	17
44	9,776768	9,903864	9,872903	10,127097	9,786741	9,898104	9,888638	10,111362	16
45	9,776937	9,903770	9,873167	10,126833	9,786909	9,898006	9,888899	10,111101	15
46	9,777106	9,903676	9,873430	10,126570	9,787069	9,897908	9,889160	10,110840	14
47	9,777275	9,903581	9,873694	10,126306	9,787232	9,897810	9,889421	10,110579	13
48	9,777444	9,903486	9,873957	10,126043	9,787395	9,897112	9,889682	10,110318	12
49	9,777613	9,903392	9,874210	10,125780	9,787557	9,897614	9,889943	10,110057	11
50	9,777781	9,903298	9,8 4484	10,125516	9,787720	9,897516	9,890204	10,109796	10
51	9,777950	9,903203	9,874747	10,125253	9,787883	9,897418	9,890465	10,109535	9
52	9,778119	9,903108	9,875010	10,124990	9,788045	9,897320	9,890725	10,109275	8
53	9,778287	9,903013	9,875273	10,124727	9,788208	9,897222	9,890986	10,109014	7
54	9,778455	9,902919	9,875536	10,124464	9,788370	9,897123	9,891247	10,108753	6
55	9,778623	9,902824	9,875799	10,124201	9,788532	9,897025	9,891507	10,108493	5
56	9,778792	9,902729	9,876063	10,123937	9,788694	9,896926	9,891768	10,108232	4
57	9,778960	9,902634	9,876326	10,123674	9,788856	9,896828	9,892028	10,107972	3
58	9,779129	9,902539	9,876589	10,123411	9,789018	9,896729	9,892289	10,107711	2
59	9,779295	9,902444	9,876851	10,123149	9,789180	9,896631	9,892549	10,107451	1
60	9,779463	9,902349	9,877114	10,122886	9,789342	9,896532	9,892810	10,107190	0
	Co-sine	Sine	Co-tang.	Tangent	Co-sine	Sine	Co-tang.	Tangent	M
	Degree 53.				Degree 52.				

	Degree 38.				Degree 39				
M	Sine	*Co-sine.*	Tangent.	*Co-tang.*	Sine	*Co-sine*	Tangent.	*Co-tang.*	
0	9,789342	9,896532	9,892810	10,107190	9,798872	9,890503	9,908369	10,091631	60
1	9,789504	9,896433	9,893070	10,106930	9,799028	9,890400	9,908627	10,091373	59
2	9,789665	9,896335	9,893330	10,106669	9,799184	9,890298	9,908886	10,091114	58
3	9,789827	9 896236	9,893591	10,106409	9,799339	9,890195	9,909144	10,090856	57
4	9,789988	9,896137	9,893851	10,106149	9,799495	9,890093	9 909402	10,090598	56
5	9.790149	9,896038	9,894111	10,105889	9,799651	9,889990	9,909660	10,090340	55
6	9,790310	9,895939	9,894371	10,105628	9,799806	9,889888	9,909918	10,090081	54
7	9,790471	9,895840	9,894632	10,105368	9,799961	9,889785	9,910176	10,089823	53
8	9,790632	9,895741	9,894892	10,105108	9,800117	9,889682	9,910435	10,089565	52
9	9,790793	9,895641	9,895152	10,104848	9,800272	9,889579	9,910693	10,089307	51
10	9,790954	9,895542	9,895412	10,104588	9,800427	9,889476	9,910951	10,089049	50
11	9 791115	9,895443	9,895672	10,104328	9,800582	9,889374	9 911209	10,088791	49
12	9,791275	9,895343	9,895932	10,104068	9,800737	9,889271	9,911467	10,088533	48
13	9,791436	9,895244	9,896192	10,103808	9,800892	9,889167	9,911724	10,088275	47
14	9,791596	9,895144	9,896452	10,103548	9,801047	9,889064	9,911982	10,088017	46
15	9,791756	9,895045	9,896712	10,103288	9,801201	9,888961	9 912240	10,087760	45
16	9,791917	9,894945	9,896971	10,103028	9,801356	9,888858	9,912498	10,087502	44
17	9,792077	9,894846	9,897231	10,102769	9,801510	9,888755	9 912756	10,087244	43
18	9,792237	9,894746	9,897491	10,102509	9,801665	9,888651	9,913014	10,086986	42
19	9,792397	9,894646	9,897751	10,102249	9,801819	9,888548	9 913271	10,086729	41
20	9,792557	9,894546	9,898010	10,101990	9,801973	9,888444	9,913529	10,086471	40
21	9,792716	9,894446	9,898270	10,101730	9,802127	9,888341	9,913787	10,086213	39
22	9,792876	9,894346	9,898530	10,101470	9,802282	9,888237	9 914044	10,085956	38
23	9,793035	9,894246	9,898789	10,101211	9,802435	9,888133	9,914302	10,085698	37
24	9,793195	9,894146	9,899049	10,100951	9,802589	9 888030	9,914560	10,085440	36
25	9,793354	9,894046	9,899308	10,100692	9,802743	9,887926	9,914817	10,085183	35
26	9,793513	9,893946	9,899568	10,100432	9,802897	9,887822	9,915075	10,084925	34
27	9,793673	9,893845	9,899827	10,100173	9,803050	9,887718	9,915332	10,084668	33
28	9,793832	9,893745	9,900086	10,099913	9,803204	9,887614	9,915590	10,084410	32
29	9,793991	9,893645	9,900346	10,099654	9,803357	9,887510	9,915847	10,084153	31
30	9,794149	9,893544	9,900605	10,099395	9,803510	9,887406	9,916104	10,083895	30
31	9,794308	9,893444	9,900864	10,099135	9 803654	9,887302	9,916362	10,083638	29
32	9,794467	9,893343	9,901124	10,098876	9,803817	9,887198	9,916619	10,083381	28
33	9,794626	9,893243	9 901383	10,098617	9,803970	9,887093	9,916876	10,083123	27
34	9,794784	9,893142	9,901642	10,098358	9,804123	9,887989	9,917134	10,082866	26
35	9,794942	9,893041	9,901901	10,098099	9,804276	9,886884	9,917391	10,082609	25
36	9,795101	9 892940	9,902160	10,097839	9,804428	9,886780	9,917648	10,082352	24
37	9 795259	9,892839	9,902419	10,097580	9,804581	9,886675	9,917905	10,082094	23
38	9,795417	9,892738	9 902678	10,097321	9,804734	9,886571	9,918162	10,081837	22
39	9,795575	9,892637	9,902937	10,097062	9,804886	9,886466	9,913420	10,081580	21
40	9,795733	9,892536	9,903196	10,096803	9,805038	9,886361	9,918677	10,081323	20
41	9,795891	9,892435	9,903455	10,096544	9,805191	9,886257	9,918934	10,081066	19
42	9,796049	9,892334	9,903714	10,096285	9,805343	9,886152	9,919191	10,080809	18
43	9,796206	9,892233	9,903973	10,096027	9,805495	9,886047	9,919448	10 080552	17
44	9,796364	9,892132	9 904232	10,095768	9,805647	9,885942	9,919705	10,080295	16
45	9,796521	9,892030	9,904491	10,095509	9,805799	9,885837	9,919962	10,080038	15
46	9,796678	9,891929	9,904750	10,095250	9,805951	9,885732	9,920219	10,079781	14
47	9 796836	9,891827	9,905208	10,094991	9,806103	9,885627	9,920476	10,079524	13
48	9,796993	9,891726	9,905267	10,094733	9,806254	9,885521	9,920733	10,079267	12
49	9,797150	9,891624	9,905526	10 094474	9,806406	9,885416	9,920990	10,079010	11
50	9,797307	9,891522	9,905784	10,094215	9,806557	9,885311	9,921247	10,078753	10
51	9 797464	9,891421	9,906043	10,093957	9,806709	9,885205	9,921503	10,078496	9
52	9.797621	9,891319	9,906302	10,093698	9,806860	9,885100	9,921760	10,078240	8
53	9,797777	9,891217	9,906560	10,093440	9,807011	9 884994	9,922017	10.077983	7
54	9 797934	9,891115	9 906819	10,093181	9,807162	9,884889	9,922274	10,077726	6
55	9,798091	9,891013	9,907077	10,092923	9,807314	9,884783	9,922530	10,077469	5
56	9.798247	9 890911	9 907336	10,092664	9,807464	9,884677	9,922787	10,077213	4
57	9,798403	9,890809	9,907594	10,092406	9 807615	9 884572	9,923044	10 076956	3
58	9,798560	9,890707	9,907852	10,092147	9,807766	9,884466	9,923300	10,076699	2
59	9,798716	5,890605	9,908111	10,091889	9 867917	9,884360	9,923557	10,076443	1
60	9.798872	9,890503	9,908369	10,091631	9,808067	9,884254	9,923813	10,076186	0
	Co-sine	Sine	*Co-tang.*	Tangent.	*Co-sine*	Sine	*Co-tang.*	Tangent,	M
	Degree 51.				Degree 50.				

	Degree 40.				Degree 41.				
M	Sine	*Co-sine.*	Tanget,	*Co-tang.*	Sine	*Co-sine*	Tanget.	*Co-tang.*	
0	9,808067	9,884254	9,923813	10,076186	9,816943	9,877780	9,939163	10,060837	60
1	9,808218	9,884148	9,924070	10,075930	9,817088	9,877670	9,939418	10,060582	59
2	9,808368	9,884042	9,924327	10,075673	9,817233	9,877560	9,939673	10,060327	58
3	9,808519	9,883936	9,924583	10,075417	9,817378	9,877450	9,939928	10,060072	57
4	9,808669	9,883829	9,924839	10,075160	9,817523	9,877340	9,940183	10,059816	56
5	9,808819	9,883723	9,925096	10,074904	9,817668	9,877230	9,940438	10,059562	55
6	9,808969	9,883617	9,925352	10,074647	9,817813	9,877120	9,940693	10,059307	54
7	9,809119	9,883510	9,925609	10,074391	9,817958	9,877009	9,940948	10,059052	53
8	9,809269	9,883404	9,925865	10,074135	9,818103	9,876899	9,941203	10,058797	52
9	9,809419	9,883297	9,926121	10,073878	9,818247	9,876789	9,941458	10,058542	51
10	9,809569	9,883191	9,926378	10,073622	9,818392	9,876678	9,941713	10,058287	50
11	9,809718	9,883084	9,926634	10,073366	9,818536	9,876568	9,941968	10,058032	49
12	9,809868	9,882977	9,926890	10,073110	9,818681	9,876457	9,942223	10,057777	48
13	9,810017	9,882871	9,927147	10,072853	9,818825	9,876347	9,942478	10,057522	47
14	9,810166	9,882764	9,927403	10,072597	9,818969	9,876236	9,942733	10,057267	46
15	9,810316	9,882657	9,927659	10,072341	9,818113	9,876125	9,942988	10,057012	45
16	9,810465	9,882550	9,927915	10,072085	9,819257	9,876014	9,943243	10,056757	44
17	9,810614	9,882443	9,928171	10,071829	9,819401	9,875904	9,943498	10,056502	43
18	9,810763	9,882336	9,928427	10,071573	9,819545	9,875793	9,943752	10,056248	42
19	9,810912	9,882228	9,928683	10,071317	9,819689	9,875682	9,944007	10,055993	41
20	9,810061	9,882121	9,928940	10,071060	9,819832	9,875571	9,944262	10,055738	40
21	9,811210	9,882014	9,929196	10,070804	9,819976	9,875459	9,944517	10,055483	39
22	9,811358	9,881907	9,929452	10,070548	9,820119	9,875348	9,944771	10,055229	38
23	9,811506	9,881799	9,929708	10,070292	9,820263	9,875237	9,945026	10,054974	37
24	9,811655	9,881692	9,929964	10,070036	9,820406	9,875125	9,945281	10,054719	36
25	9,811804	9,881584	9,930219	10,069781	9,820549	9,875014	9,945535	10,054464	35
26	9,811952	9,881477	9,930475	10,069525	9,820693	9,874903	9,945790	10,054210	34
27	9,812100	9,881369	9,930731	10,069269	9,820836	9,874791	9,946045	10,053955	33
28	9,812248	9,881261	9,930987	10,069013	9,820979	9,874679	9,946299	10,053701	32
29	9,812396	9,881153	9,931243	10,068757	9,821122	9,874568	9,946554	10,053446	31
30	9,812544	9,881045	9,931499	10,068501	9,821264	9,874456	9,946808	10,053192	30
31	9,812692	9,880937	9,931755	10,068245	9,821407	9,874344	9,947063	10,052937	29
32	9,812840	9,880829	9,932010	10,067989	9,821550	9,874232	9,947317	10,052682	28
33	9,812988	9,880721	9,932266	10,067734	9,821692	9,874120	9,947572	10,052428	27
34	9,813135	9,880613	9,932522	10,067478	9,821835	9,874008	9,947826	10,052173	26
35	9,813283	9,880505	9,932778	10,067222	9,821977	9,873896	9,948081	10,051919	25
36	9,813430	9,880397	9,933033	10,066967	9,822120	9,873784	9,948335	10,051664	24
37	9,813578	9,880289	9,933289	10,066711	9,822262	9,873672	9,948590	10,051410	23
38	9,813725	9,880180	9,933545	10,066455	9,822404	9,873560	9,948844	10,051156	22
39	9,813872	9,880072	9,933800	10,066200	9,822546	9,873447	9,949099	10,050901	21
40	9,814019	9,879963	9,934056	10,065944	9,822688	9,873335	9,949353	10,050647	20
41	9,814166	9,879855	9,934311	10,065688	9,822830	9,873223	9,949607	10,050393	19
42	9,814313	9,879746	9,934567	10,065433	9,822972	9,873110	9,949862	10,050138	18
43	9,814460	9,879637	9,934822	10,065177	9,823114	9,872998	9,950116	10,049884	17
44	9,814607	9,879529	9,935078	10,064922	9,823255	9,872885	9,950370	10,049630	16
45	9,814753	9,879420	9,935333	10,064666	9,823397	9,872772	9,950625	10,049375	15
46	9,814900	9,879311	9,935589	10,064411	9,823538	9,872659	9,950879	10,049121	14
47	9,815046	9,879202	9,935844	10,064156	9,823680	9,872546	9,951133	10,048867	13
48	9,815193	9,879093	9,936100	10,063900	9,823821	9,872434	9,951388	10,048612	12
49	9,815339	9,878984	9,936355	10,063645	9,823962	9,872321	9,951642	10,048358	11
50	9,815485	9,878875	9,936610	10,063389	9,824104	9,872208	9,951896	10,048104	10
51	9,815631	9,878766	9,936866	10,063134	9,824245	9,872094	9,952150	10,047850	9
52	9,815777	9,878656	9,937121	10,062879	9,824386	9,871981	9,952424	10,047575	8
53	9,815923	9,878547	9,937376	10,062623	9,824527	9,871868	9,952659	10,047341	7
54	9,816069	9,878438	9,937632	10,062368	9,824667	9,871755	9,952913	10,047087	6
55	9,816215	9,878328	9,937887	10,062113	9,824808	9,871641	9,953167	10,046833	5
56	9,816361	9,878219	9,938142	10,061858	9,824949	9,871528	9,953421	10,046579	4
57	9,816506	9,878109	9,938397	10,061602	9,825090	9,871414	9,953675	10,046325	3
58	9,816652	9,877999	9,938653	10,061347	9,825230	9,871301	9,953929	10,046071	2
59	9,816797	9,877890	9,938908	10,061092	9,825370	9,871187	9,954183	10,045817	1
60	9,816943	9,877780	9,939163	10,060837	9,825511	9,871073	9,954437	10,045563	0
	Co-sine	Sine	*Co-tang.*	Tangent	*Co-sine*	Sine	*Co-tang.*	Tangent	M
	Degree 49.				Degree 48.				

	Degree 42.				Degree 43				
M	Sine	Co-sine.	Tangent.	Co-tang.	Sine	Co-sine	Tangent.	Co-tang.	
0	9,825511	9,871073	9,954437	10,045562	9,833783	9,864127	9,969656	10,030344	60
1	9,825651	9,870960	9,954691	10,045308	9,833919	9,864010	9,969909	10,030091	59
2	9,825791	9,870846	9,954945	10,041054	9,834054	9,863892	9,970162	10,029838	58
3	9,825931	9,870732	9,955199	10,044800	9,834189	9,863774	9,970416	10,029584	57
4	9,826071	9,870618	9,955453	10,044546	9,834324	9,863656	9,970669	50,029331	56
5	9,826211	9,870504	9,955707	10,044292	9,834460	9,863537	9,970922	10,029078	55
6	9,826351	9,870390	9,955961	10,044038	9,834595	9,863419	9,971175	10,028827	54
7	9,826491	9,870275	9,956215	10,043784	9,834730	9,863301	9,971428	10,028571	53
8	9,826631	9,870161	9,956469	10,043531	9,834865	9,863183	9,971652	10,028318	52
9	9,826770	9,870047	9,956723	10,043276	9,834999	9,863064	9,971935	10,028065	51
10	9,826910	9,869933	9,956977	10,043023	9,835134	9,862946	9,972188	10,027812	50
11	9,827049	9,869818	9,957231	10,042769	9,835269	9,862827	9,972441	10,027559	49
12	9,827189	9,869704	9,957485	10,042515	9,835503	9,862709	9,972694	10,027306	48
13	9,827328	9,869589	9,957739	10,042261	9,835538	9,862590	9,972948	10,027052	47
14	9,827467	9,869474	9,957993	10,042007	9,835672	9,862471	9,973201	10,026799	46
15	9,827606	9,869360	9,958246	10,041753	9,835806	9,862353	9,973454	10,026546	45
16	9,827745	9,869245	9,958500	10,041500	9,835941	9,862234	9,973707	10,026293	44
17	9,827884	9,869130	9,958754	10,041246	9,836075	9,862115	9,973960	10,026040	43
18	9,828023	9,869015	9,959008	10,040992	9,836209	9,861996	9,974213	10,025787	42
19	9,828162	9,868902	9,959262	10,040738	9,836343	9,861877	9,974466	10,025533	41
20	9,828301	9,868785	9,959515	10,040485	9,836477	9,861757	9,974719	10,025280	40
21	9,828439	9,868670	9,959769	10,040231	9,836611	9,861638	9,974973	10,025027	39
22	9,828578	9,868555	9,960023	10,039977	9,836745	9,861519	9,975229	10,024774	38
23	9,828716	9,868439	9,960277	10,039723	9,836878	9,861399	9,975479	10,024521	37
24	9,828855	9,868324	9,960530	10,039469	9,837012	9,861280	9,975732	10,024268	36
25	9,828993	9,868209	9,960784	10,039216	9,837146	9,861161	9,975985	10,024015	35
26	9,829131	9,868093	9,961038	10,038962	9,837279	9,861041	9,976238	10,023762	34
27	9,829269	9,867978	9,961291	10,038608	9,837412	9,860921	9,976491	10,023509	33
28	9,829407	9,867862	9,961545	10,038451	9,837546	9,860802	9,976744	10,023256	32
29	9,829545	9,867747	9,961799	10,038201	9,837679	9,860682	9,976997	10,023003	31
30	9,829683	9,867631	9,962052	10,037947	9,837812	9,860562	9,977250	10,022750	30
31	9,829821	9,867515	9,962306	10,037694	9,837945	9,860442	9,977503	10,022497	29
32	9,829959	9,867399	9,962560	10,037440	9,838078	9,860322	9,977756	10,022244	28
33	9,830096	9,867283	9,962813	10,037187	9,838211	9,860202	9,978009	10,021991	27
34	9,830234	9,867167	9,963067	10,036933	9,838344	9,860082	9,978262	10,021738	26
35	9,830372	9,867051	9,963320	10,036680	9,838477	9,859962	9,978515	10,021485	25
36	9,830509	9,866935	9,963574	10,036426	9,838609	9,859842	9,978768	10,021232	24
37	9,830646	9,866819	9,963827	10,036173	9,838742	9,859721	9,979021	10,020979	23
38	9,830784	9,866703	9,964081	10,035919	9,838875	9,859601	9,979274	10,020726	22
39	9,830921	9,866586	9,964335	10,035665	9,839007	9,859480	9,979527	10,020473	21
40	9,831058	9,866470	9,964588	10,035412	9,839140	9,859360	9,979780	10,020220	20
41	9,831195	9,866353	9,964842	10,035158	9,839272	9,859239	9,980033	10,019967	19
42	9,831332	9,866237	9,965095	10,034905	9,839484	9,859118	9,980285	10,019714	18
43	9,831469	9,866120	9,965348	10,034652	9,839536	9,858998	9,980538	10,019461	17
44	9,831606	9,866004	9,965602	10,034398	9,839668	9,858877	9,980791	10,019209	16
45	9,831742	9,865887	9,965855	10,034144	9,839800	9,858756	9,981044	10,018956	15
46	9,831879	9,865770	9,966109	10,033891	9,839932	9,858639	9,981297	10,018703	14
47	9,832015	9,865653	9,969362	10,033638	9,840064	9,858514	9,981550	10,018450	13
48	9,832152	9,865536	9,966616	10,033384	9,840196	9,858398	9,981803	10,018197	12
49	9,832288	9,865419	9,966869	10,033131	9,840428	9,858272	9,982056	10,017944	11
50	9,832425	9,865302	9,967122	10,032878	9,840459	9,858150	9,982309	10,017691	10
51	9,832561	9,865185	9,967376	10,032624	9,840591	9,858029	9,982562	10,017438	9
52	9,832697	9,865068	9,967629	10,032371	9,840722	9,857908	9,982814	10,017185	8
53	9,832833	9,864950	9,967883	10,032117	9,840854	9,857786	9,983067	10,016933	7
54	9,832969	9,864833	9,968136	10,031864	9,840985	9,857665	9,983320	10,016680	6
55	9,833105	9,864716	9,968389	10,031611	9,841116	9,857543	9,983573	10,016427	5
56	9,833241	9,864598	9,968643	10,031357	9,841247	9,857421	9,983826	10,016174	4
57	9,833376	9,864480	9,968896	10,031104	9,841378	9,857300	9,984079	10,015921	3
58	9,833512	9,864363	9,969149	10,030851	9,841509	9,857178	9,984331	10,015668	2
59	9,833648	9,864245	9,969403	10,030597	9,841640	9,857056	9,984584	10,015416	1
60	9,833783	9,864127	9,969656	10,030344	9,841771	9,856934	9,984837	10,015163	0
	Co-sine	Sine	Co-tang.	Tangent.	Co-sine	Sine	Co-tang.	Tangent,	M
	Degree 47.				Degree 46.				

Degree 44.

M	Sine	Co-sine.	Tangent,	Co-tang.	
0	9,841771	9,856934	9,984837	10,015162	60
1	9,841902	9,856812	9,985090	10,014910	59
2	9,842033	9,856690	9,985343	10,014657	58
3	9,842163	9,856568	9,985596	10,014404	57
4	9,842294	9,856445	9,985848	10,014151	56
5	9,842424	9,856323	9,986101	10,013899	55
6	9,842555	9,856201	9,986354	10,013646	54
7	9,842685	9,856078	9,986607	10,013393	53
8	9,842815	9,855956	9,986859	10,013140	52
9	9,842945	9,855833	9,987112	10,012888	51
10	9,843076	9,835710	9,987365	10,012635	50
11	9,843206	9,855588	9,987618	10,012382	49
12	9,843336	9,855465	9,987871	10,012129	48
13	9,843465	9,855342	9,988123	10,011877	47
14	9,843595	9,855219	9,988376	10,011624	46
15	9,843725	9,855096	9,988629	10,011371	45
16	9,843855	9,854973	9,988882	10,011118	44
17	9,843984	9,854850	9,989134	10,010866	43
18	9,844114	9,854727	9,989387	10,010613	42
19	9,844243	9,854603	9,989640	10,010360	41
20	9,844372	9,854480	9,989893	10,010107	40
21	9,844502	9,854356	9,990145	10,009855	39
22	9,844631	9,854233	9,990398	10,009602	38
23	9,844760	9,854109	9,990651	10,009349	37
24	9,844889	9,853986	9,990903	10,009096	36
25	9,845018	9,853862	9,991156	10,008844	35
26	9,845147	9,853738	9,991409	10,008591	34
27	9,845276	9,853614	9,991662	10,008338	33
28	9,845404	9,853490	9,991914	10,008086	32
29	9,845533	9,853366	9,992167	10,007833	31
30	9,845662	9,853242	9,992420	10,007580	30
31	9,845790	9,853118	9,992672	10,007328	29
32	9,845919	9,852994	9,992925	10,007075	28
33	9,846047	9,852869	9,993178	10,006822	27
34	9,846175	9,852745	9,993430	10,006569	26
35	9,846304	9,852620	9,993683	10,006317	25
36	9,846432	9,852496	9,993936	10,006064	24
37	9,846560	9,852371	9,994189	10,005811	23
38	9,846688	9,852246	9,994441	10,005559	22
39	9,846816	9,852122	9,994694	10,005306	21
40	9,846944	9,851997	9,994947	10,005053	20
41	9,847071	9,851872	9,995199	10,004801	19
42	9,847199	9,851747	9,995452	10,004548	18
43	9,847327	9,851622	9,995701	10,004295	17
44	9,847454	9,851497	9,995957	10,004043	16
45	9,847582	9,851372	9,996210	10,003790	15
46	9,847709	9,851246	9,996463	10,003537	14
47	9,847836	9,851121	9,996715	10,003285	13
48	9,847964	9,850996	9,996968	10,003032	12
49	9,848091	9,850870	9,997220	10,002779	11
50	9,848218	9,850745	9,997473	10,002527	10
51	9,848345	9,850619	9,997726	10,002274	9
52	9,848472	9,850493	9,997979	10,002021	8
53	9,848599	9,850367	9,998231	10,001769	7
54	9,848726	9,850242	9,998484	10,001516	6
55	9,848852	9,850116	9,998737	10,001263	5
56	9,848979	9,849990	9,998989	10,001011	4
57	9,849106	9,849864	9,999242	10,001758	3
58	9,849232	9,849737	9,999495	10,000505	2
59	9,849359	9,849611	9,999747	10,000253	1
60	9,849485	9,849485	10,000000	10,000000	0
	Co-sine	Sine	Co-tang.	Tangent	M

Degree 45.

CHILIADES
DECEM
LOGARITHMORUM,

CONTEINING

The LOGARITHMES of all Numbers increasing by
Naturall succession from an Unite to 10000: Whereby the *Logarithmes* of all Numbers under 1000000 may speedily be deduced.

First Calculated by that excellent Mathematician
M^{r}. HENRY BRIGGS,
Professor of Geometry *in the University of* Oxford:
And their use now much amplified.

By VINCENT WING. *Philomathemat.*

LONDON:
Printed by ROBERT LEYBOURN, for the
Company of STATIONERS, 1651.

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The Table of *Logarithmes.*

N	0	1	2	3	4	5	6	7	8	9
1	0,000000	041393	079181	113943	146128	176091	204120	230449	255272	278754
2	0,301030	322219	342423	361728	380211	397940	414973	431364	447158	462398
3	0,477121	491362	505150	518514	531479	504068	556303	568202	579784	591065
4	0,602060	612784	623249	633468	643453	653213	662758	672098	681241	690196
5	0,698970	707570	716003	724276	732394	740363	748188	755875	763428	770852
6	0,778151	785330	792392	799341	806180	812913	819544	826075	832509	838849
7	0,845098	851258	857332	863323	869232	875061	880814	886491	892095	897627
8	0,903090	908485	913814	919078	924279	929419	934498	939519	944483	949390
9	0,954242	959041	963788	968483	973128	977724	982271	986772	991226	995635
10	1,00 000	004321	008600	012837	017033	021189	025306	029384	033424	037426
11	1,041393	045323	049218	053078	056905	060698	064458	068186	071882	075547
12	1,079181	082785	086360	089905	093422	096910	100371	103804	107210	110590
13	1,113943	117271	120574	123852	127105	130334	133539	136721	139879	143015
14	1,146128	149219	152288	155336	158362	161368	164353	167317	170262	173186
15	1,176091	178977	181844	184691	187521	19 332	193125	195900	198658	201397
16	1,204120	206826	209515	212188	214844	217484	220108	222716	225309	227887
17	1,230449	232996	235528	238046	240549	243038	245513	247973	250420	252853
18	1,255272	257679	260071	262451	264819	267172	269513	271842	274158	276462
19	1,278754	281033	283301	285557	287802	290035	292256	294466	296665	298853
20	1,301030	303196	305351	307496	309630	311754	313867	315970	318063	320146
21	1,322219	324282	326336	328380	330414	332438	334454	336460	338456	340444
22	1,342423	344392	346353	348305	350248	352183	354108	356026	357935	359835
23	1,361728	363612	365488	367356	369216	371068	372912	374748	376577	378398
24	1,380211	382017	383815	385606	387390	389166	390935	392697	394452	396199
25	1,397940	399674	401401	403121	404834	406540	408240	409933	411620	413300
26	1,414973	416641	418301	419956	421604	423246	424882	426511	428185	429752
27	1,431364	432969	434569	436163	437751	439333	440909	442480	444045	445604
28	1,447158	448706	450249	451786	453318	454845	456366	457882	459392	460898
29	1,462398	463893	465383	466868	468347	469822	471292	472756	474216	475671
30	1,477121	478566	480007	481443	482874	484300	485721	487138	488551	489958
31	1,491362	492760	494155	495544	496930	498311	499687	501059	502427	503791
32	1,505150	506505	507856	509203	510545	511883	513218	514550	515874	517196
33	1,518514	519828	521138	522444	523746	525045	526339	527630	528917	530200
34	1,531479	532754	534026	535294	536558	537819	539076	540329	541579	542825
35	1,544068	545307	546543	547775	549003	550228	551450	552668	553883	555094
36	1,556302	557507	558709	559907	561101	562293	563481	564666	565848	567026
37	1,568202	569374	570543	571709	572872	574031	575188	576341	577492	578639
38	1,579783	580925	582063	583199	584331	585461	586587	587711	588832	589950
39	1,591065	592177	593286	594393	595496	596597	597695	598791	599883	600973
40	1,602060	603144	604226	605305	606381	607155	608526	609594	610660	611723
41	1,612784	613842	614897	615950	617000	618048	619093	620136	621176	622214
42	1,623249	624282	625312	626340	627366	628389	629410	630428	631444	632457
43	1,633468	634477	635484	636488	637490	638489	639486	640481	641474	642464
44	1,643453	644439	645422	646404	647383	648360	649335	650308	651278	652246
45	1,653213	654177	655138	656098	657056	658011	658965	659916	660865	661813
46	1,662758	663701	664642	665581	666518	667453	668386	669317	670246	671173
47	1,672098	673021	673942	674861	675778	676694	677607	678518	679428	680336
48	1,681241	682145	683047	683947	684845	685742	686636	687529	688420	689309
49	1,690196	691081	691965	692847	693727	6946 5	695482	696356	697229	698101
50	1,698970	699838	700704	701568	702431	703291	704151	705008	705864	706718

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The Table of *Logarithmes.*

N	0	1	2	3	4	5	6	7	8	9
51	1,707570	708421	709270	710117	710963	711807	712650	713491	714330	715167
52	1,716003	716838	717670	718502	719331	720159	720986	721811	722634	723456
53	1,724276	725095	725912	726727	727541	728354	729165	729974	730782	731589
54	1,732394	733197	733999	734800	735599	736397	737193	737987	738780	739572
55	1,740363	741152	741939	742725	743510	744293	745075	745855	746634	747412
56	1,748188	748963	749736	750508	751279	752048	752816	753583	754348	755112
57	1,755875	756636	757396	758155	758912	759668	760422	761176	761928	762679
58	1,763428	764176	764923	765669	766413	767156	767898	768638	769377	770115
59	1,770852	771587	772321	773055	773786	774517	775246	775974	776701	777427
60	1,778151	778874	779596	780317	781037	781755	782473	783189	789304	784617
61	1,785330	786041	786751	787460	788168	788875	789521	790285	790988	791691
62	1,792392	793092	793790	794488	795185	795880	796574	797268	797960	798651
63	1,799341	800029	800717	801404	802089	802774	803457	804139	804821	805501
64	1,806180	806858	807535	808211	808886	809560	810233	810[illegible]04	811575	812245
65	1,812913	813581	814248	814913	815578	816241	816904	817565	818226	818885
66	1,819544	820211	820858	821514	822168	822822	823474	824126	824776	825426
67	1,826075	826723	827369	828015	828660	829304	829947	830589	831230	831870
68	1,832509	833147	833784	834421	835056	835691	836324	836957	837588	838219
69	1,838849	839478	840106	840733	841359	841985	842609	843233	843855	844477
70	1,845098	845718	846337	846955	847573	848189	848805	849419	850033	850646
71	1,851258	851870	852480	853090	853698	854306	854913	855519	856124	856729
72	1,857332	857935	858537	859138	859739	860338	860937	861534	862131	862728
73	1,863323	863917	864511	865104	865696	866287	866878	867467	868056	868644
74	1,869232	869818	870404	870989	871573	872156	872739	873321	873902	874482
75	1,875061	875640	876218	876795	877371	877947	878522	879096	879669	880242
76	1,880814	881385	881955	882525	883093	883661	884229	884795	885361	885926
77	1,886491	887054	887617	888179	888741	889302	889862	890421	890980	891537
78	1,892095	892651	893207	893762	894316	894870	895423	895975	896526	897077
79	1,897627	898176	898725	899273	899821	900367	900913	901458	902003	902547
80	1,903089	903633	904174	904716	905256	905796	906335	906874	907411	907949
81	1,908485	909021	909556	910091	910624	911158	911690	912222	912753	913284
82	1,913814	914343	914872	915400	915927	916454	916980	917586	918030	918555
83	1,919078	919601	920123	920645	921166	921686	922206	922725	923244	923762
84	1,924279	924796	925312	925828	926342	926857	927370	927883	928396	928908
85	1,929419	929930	930440	930949	931458	931966	933474	932981	933487	933993
86	1,934498	935003	935507	936011	936514	937016	937518	938019	938520	939020
87	1,939519	940018	940516	941014	941511	942008	942504	943000	943495	943989
88	1,944483	944976	945469	945961	946452	946943	947434	947924	948413	948902
89	1,949390	949878	950365	950851	951338	951823	952308	952792	953276	953760
90	1,954242	954725	955207	955688	956168	956649	957128	957607	958086	958564
91	1,959041	959518	959995	960471	960946	961421	961895	962369	962843	963316
92	1,963788	964260	964731	965202	965672	966142	966611	967080	967548	968016
93	1,968483	968950	969416	969882	970347	970812	971276	971740	972203	972666
94	1,973128	973590	974051	974512	974972	975432	975891	976350	976808	977266
95	1,977724	978181	978637	979093	979548	980003	980458	980912	981366	981819
96	1,982271	982723	983175	983626	994077	984527	984977	985426	985875	986324
97	1,986772	987219	987666	988113	988559	989005	989450	989895	990339	990783
98	1,991226	991669	992111	992554	992995	993436	993877	994317	994757	995196
99	1,995635	996074	996512	996949	997386	897823	998259	998695	999131	999565
100	2,000000	000434	000868	001301	001734	002166	002598	003029	003461	003891

The Table of *Logarithmes*.

N	0	1	2	3	4	5	6	7	8	9
101	004321	004751	005181	005609	006038	006466	006894	007321	007748	008174
102	008600	009026	009451	009876	010299	010724	011147	011570	011993	012415
103	012837	013259	013679	014100	014521	014940	015359	015779	016197	016616
104	017033	017451	017868	018284	018700	019116	019532	019947	020361	020775
105	021189	021603	022016	022428	022841	023252	023664	024075	024486	024896
106	025306	025715	026125	026533	026942	027349	027757	028164	028571	028978
107	029384	029789	030195	030599	031004	031408	031812	032216	032619	033021
108	033424	033826	034227	034628	035029	035429	035829	036229	036629	037028
109	037426	037825	038223	038620	039017	039414	039811	040207	040602	040998
110	041393	041787	042182	042576	042969	043362	043755	044148	044539	044932
111	045323	045714	046105	046495	046885	047275	047664	048 53	048442	048830
112	049218	049603	049993	050379	050766	051153	051538	051924	052309	052694
113	053078	053466	053846	054229	054613	054996	055378	055760	056142	056524
114	056905	0572[illegible]	057666	058046	058426	058805	059185	059563	059942	060320
115	060698	061075	061452	061829	062206	062582	062958	063333	063709	064083
116	064458	064832	065206	065579	065953	066326	066699	067 71	067443	067815
117	068186	068557	068928	069298	069668	070038	0704 7	070776	071145	071514
118	071882	072249	072617	072985	073352	073718	074 85	074451	074816	075182
119	075547	075912	076276	076640	077004	077368	077731	078094	078457	078819
120	079181	079543	079904	080266	080626	080987	081347	081707	082067	082426
121	082785	083144	0835 3	083861	084219	084576	084934	085291	085647	086004
122	086359	086716	087071	087426	087781	088136	088490	088845	089198	089552
123	089905	090258	090610	090963	091315	091667	092018	092369	092721	093071
124	093422	093772	094122	094471	094820	095169	095518	095866	096215	096562
125	096910	097257	0976 4	097951	098298	098644	098989	099335	099681	100026
126	100371	100715	101050	101403	101747	102 91	102434	102777	103119	103462
127	103804	104146	104487	104828	105169	105510	105851	106191	106531	106871
128	107209	107549	107888	108227	108565	1089 3	109241	109579	109916	110253
129	110589	11 926	111263	111599	111934	112269	1126 5	112939	113275	113609
130	113943	114277	114611	114944	115278	115611	115943	116276	116608	116939
131	117271	117603	117934	118265	118595	118926	119256	119586	119915	120245
132	120574	120903	121231	121559	121888	122216	122544	122871	123198	123525
133	123852	124178	124504	124830	125156	125481	125806	126131	126456	126781
134	127105	127429	127753	128 76	128399	128722	129045	129368	129689	130012
135	13 334	130655	13 977	131298	131619	131939	132259	132579	132899	133219
136	133539	133858	134177	134496	134814	135133	135451	135769	136086	136403
137	136721	137037	137354	137671	137987	138303	138618	134934	139249	139564
138	139879	14 194	1405 8	14 822	141136	141449	141763	142076	142389	142702
139	143015	143327	143639	143951	144263	144574	144885	145196	1455 7	145818
140	146128	146438	146748	147058	147367	147676	147985	148294	148603	148911
141	149219	149527	149835	158142	150449	15 756	151063	151369	151676	151982
142	152288	152594	152899	153205	153509	153815	154119	154423	154728	155 32
143	155336	155639	155943	156246	156549	156852	157154	157457	157759	158 61
144	158362	158664	158965	159266	159567	159868	16 168	16 469	160767	161 68
145	161368	161667	161967	162266	162564	162863	163161	163459	163758	164 55
146	164353	164650	164947	165244	165541	165838	166134	166430	166726	167 22
147	167317	167613	1679 8	168203	168497	168792	169086	169380	169674	169968
148	170262	170555	170848	171141	171434	171726	172019	172311	172603	172895
149	173186	173478	173769	174059	174351	174641	174932	175222	175512	1758 2
150	176091	176381	176669	176959	177248	177536	177825	178113	178401	178689

The Table of *Logarithmes*.

N	0	1	2	3	4	5	6	7	8	9
151	178977	179264	179552	179839	180126	180413	180699	180986	181272	181558
152	181844	182129	182415	182699	182985	183269	183555	183839	184123	184407
153	184691	184975	185259	185542	185825	186108	186391	186674	186956	187239
154	187521	187803	188084	188366	188647	188928	189209	189490	189771	190051
155	190332	190612	190892	191171	191451	191730	192009	192289	192567	192846
156	193125	193403	193681	193959	194237	194514	194792	195069	195346	195623
157	195899	196176	196453	196729	197005	197281	197556	197832	198107	198382
158	198657	198932	199206	199481	199755	200029	200303	200577	200850	201124
159	201397	201670	201943	202216	202488	202761	203033	203305	203577	203848
160	204119	204391	204663	204934	205204	205475	205746	206016	206286	206556
161	206826	207096	207365	207364	207904	208173	208441	298710	208978	209247
162	209515	209783	210051	210319	210586	210853	211121	211388	211654	211921
163	212187	212454	212720	212986	213252	213518	213783	214049	214314	214579
164	214844	215109	215373	215638	215902	216166	216429	216694	216957	217221
165	217484	217747	218010	218273	218536	218798	219060	219323	219585	219846
166	220108	220369	220631	220892	221153	221414	221675	221936	222196	222456
167	222716	222976	223236	223496	223755	224015	224274	224533	224791	225051
168	225309	225568	225826	226084	226342	226599	226858	227115	227372	227629
169	227887	228142	228400	228657	228913	229169	229426	229682	229938	230193
170	230449	230704	230959	231215	231469	231724	231979	232234	232488	232742
171	232996	233250	233504	233757	234011	234264	234517	234770	235023	235276
172	235528	235781	236033	236285	236537	236789	237041	237292	237544	237795
173	238046	238297	238548	238799	239049	239299	239549	239799	240049	240299
174	240549	240799	241048	241297	241546	241795	242044	242293	242541	242789
175	243038	243286	243534	243782	244029	244277	244525	244772	245019	245266
176	245513	245759	246006	246252	246499	246745	246991	247237	247482	247728
177	247973	248219	248464	248709	248954	249198	249443	249687	249932	250176
178	250420	250664	250908	251151	151395	251638	251881	252125	252368	152610
179	252853	253096	253334	253580	253822	254064	254306	254548	254789	255031
180	255273	255514	255755	255996	256237	256477	256718	256958	257198	257438
181	257679	257918	258158	258398	258637	258877	259116	250355	259594	259833
182	260071	260309	260548	260787	261025	261263	261501	261739	261976	262214
183	262451	262688	262925	263162	263399	263366	263873	264109	264346	264582
184	264818	265054	265289	265525	265761	265996	266232	266467	266702	266937
185	267172	267406	267641	267875	268109	268344	268578	268812	269046	269279
186	269513	269746	269979	270213	270446	270679	270912	271144	271377	271609
187	271842	272074	272306	272538	272769	273001	273233	273464	273696	273927
188	274158	274389	274619	274850	275081	275311	275542	275772	276003	276232
189	276462	276692	276921	277151	277379	277609	277838	278067	278296	278525
190	278754	278982	279211	279439	279667	279895	280123	280351	280578	280806
191	281033	281261	281488	281714	281942	282169	282396	282622	282849	283075
192	283301	283527	283753	283979	284205	284431	284656	284882	285107	285332
193	285557	285782	286007	286232	286456	286681	286905	287129	287354	287578
194	287802	288026	288249	288473	288696	288919	289143	289366	289589	289812
195	290035	290257	290479	290702	290925	291147	291369	291591	291813	292034
196	292256	292478	292699	292920	293141	293362	293584	293804	294025	294246
197	294466	294687	294907	295127	295347	295567	295787	[illegible]	296226	296446
198	296665	296884	297104	297323	297542	297761	297979	298198	298416	298635
199	298853	299071	299289	299507	299725	299943	300161	300378	300595	300813
200	301029	301247	301464	301681	301898	302114	302331	302547	302764	302979

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203	307496	307709	307924	308137	308351	308564	308778	308991	309204	309417
204	309630	309843	310056	310268	310481	310693	310906	311118	311329	311542
205	311754	311966	312177	312389	312600	312812	313023	313234	313445	313656
206	313867	314078	314289	314499	314709	314920	315130	315340	315551	315760
207	315970	316180	316389	316599	316809	317018	317227	317436	317646	317854
208	318063	318272	318481	318689	318898	319106	319314	319522	319730	319938
209	320146	320354	320562	320769	320977	321184	321391	321598	321805	322012
210	322219	322426	322633	322839	323046	323252	323458	323665	323871	324077
211	324282	324488	324694	324899	325105	325310	325516	325721	325926	326131
212	326336	326541	326745	326949	327155	327359	327563	327767	327972	328176
213	328379	328583	328787	328991	329194	329398	329601	329805	330008	330211
214	330414	330617	330819	331022	331225	331427	331629	331832	332034	332236
215	332438	332640	332842	333044	333246	333447	333649	333850	334051	334253
216	334454	334655	334856	335057	335257	335458	335658	335859	336059	336259
217	336459	336659	336859	337059	337259	337459	337659	337859	338058	338257
218	338456	338656	338856	339054	339253	339453	339650	339849	340047	340246
219	340444	340642	340841	341039	341237	341435	341632	341830	342028	342225
220	342227	342620	342817	343014	343212	343409	343606	343802	343999	344196
221	344392	344589	344785	344981	345178	345737	345569	345766	345962	346157
222	346353	346549	346744	346939	347135	347330	347525	347720	347915	348110
223	348305	348499	348694	348889	349083	349278	349472	349659	349860	350054
224	350248	350442	350636	350829	351023	351216	351409	351603	351796	351989
225	352183	352375	352568	352761	352954	353147	353339	353532	353724	353916
226	354108	354301	354493	354685	354876	355068	355259	355452	355643	355834
227	356026	356217	356408	356599	356792	356981	357172	357363	357554	357744
228	357935	358125	358316	358506	358696	358886	359076	359266	359456	359646
229	359835	360025	360215	360404	360593	360783	360972	361161	361350	361539
230	361728	361917	362105	362294	362482	362671	362859	363048	363236	363424
231	363612	363799	363988	364176	364363	364551	364739	364926	365113	365301
232	365488	365675	365862	366049	366236	366423	366609	366796	366983	367169
233	367356	367542	367729	367915	368101	368287	368473	368659	368845	369030
234	369216	369401	369587	369772	369958	370143	370328	370513	370698	370882
235	371068	371253	371437	371622	371806	371991	372175	372359	372544	372728
236	372912	373096	373279	373464	373647	373831	374015	374198	374382	374565
237	374748	374932	375115	375298	375481	375664	375846	376029	376212	376394
238	376577	376159	376942	377124	377306	377488	377670	377852	378034	378216
239	378398	378579	378761	378943	379124	379306	379487	379668	379849	380030
240	380211	380392	380573	389754	380934	381115	381296	381476	381656	381837
241	382017	382197	382377	382557	382737	382917	383097	383277	383456	383636
242	383815	383995	384174	384353	384533	384712	384891	385069	385249	385428
243	385606	385785	385964	386142	386321	386499	386677	386856	387034	387212
244	387389	387568	387746	387923	388101	388279	388456	388634	388811	388989
245	389166	389343	389520	389598	389875	390051	390228	390405	390582	390759
246	390935	391112	391288	391464	391641	391817	391993	392169	392345	392521
247	392697	392873	393048	393224	393399	393575	393751	393926	394101	394277
248	394452	394627	394802	394977	395152	395326	395501	395676	395850	396025
249	396199	396374	396548	396722	396896	397071	397245	397419	397592	397766
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252	401401	401573	401745	401917	402089	402261	402433	402605	402777	402949
253	403121	403292	403464	403635	403807	403978	404149	404320	404492	404663
254	404834	405005	405176	405346	405517	405688	405858	406029	406199	406369
255	406540	406710	406881	407051	407221	407391	407561	407731	407901	408070
256	408239	408409	408579	408749	408918	409087	409257	409426	409595	409764
257	409933	410102	410271	410439	410609	410777	410946	411114	411283	411451
258	411619	411788	411956	412124	412293	412461	412629	412796	412964	413132
259	413299	413467	413635	413803	413969	414137	414305	414472	414639	414806
260	414973	415140	415307	415474	415641	415808	415974	416141	416308	416474
261	416641	416807	416973	417139	417306	417472	417638	417804	417969	418135
262	418301	418467	418633	418798	418964	419129	419295	419460	419625	419791
263	419956	420121	420286	420451	420616	420781	420945	421110	421275	421439
264	421604	421768	421933	422097	422261	422426	422589	422754	422918	423082
265	423246	423409	423574	423737	423901	424065	424228	424392	424555	424718
266	424882	425045	425208	425371	425534	425697	425860	426023	426186	426349
267	426511	426674	426836	426999	427161	427324	427486	427648	427811	427973
268	428135	428297	428459	428621	428783	428944	429106	429268	429429	429591
269	429752	429914	430075	430236	430398	430559	430719	430881	431042	431203
270	431364	431525	431685	431846	432007	432167	432328	432488	432649	432809
271	432969	433129	433289	433449	433609	433769	433929	434089	434249	434409
272	434569	434729	434888	435048	435207	435366	435526	435685	435844	436004
273	436163	436322	436481	436639	436799	436957	437116	437275	437433	437592
274	437751	437909	438067	438226	438384	438542	438701	438859	439017	439175
275	439333	439491	439648	439806	439964	440122	440279	440437	440594	440752
276	440909	441066	441224	441381	441538	441695	441852	442009	442166	442323
277	442479	442637	442793	442949	443106	443263	443419	443576	443732	443889
278	444045	444201	444357	444513	444669	444825	444981	445137	445293	445449
279	445604	445759	445915	446071	446226	446382	446537	446692	446848	447003
280	447158	447313	447468	447623	447778	447932	448088	448242	448397	448552
281	448706	448861	449015	449169	449324	449478	449633	449787	449941	450095
282	450249	450403	450557	450711	450865	451018	451172	451326	451479	451633
283	451786	451939	452093	452247	452399	452553	452706	452859	453012	453165
284	453318	453471	453624	453777	453929	454082	454235	454387	454539	454692
285	454845	454997	455149	455302	455454	455606	455758	455910	456062	456214
286	456366	456518	456669	456821	456973	457125	457276	457428	457579	457731
287	459889	458033	458184	458336	458487	458638	458789	458939	459091	459242
288	459392	459543	459694	459845	459995	460146	460296	460447	460597	460748
289	460898	461048	461198	461348	461499	461649	461799	461948	462098	462248
290	462398	462548	462697	462847	462997	463146	463296	463445	463594	463744
291	463893	464042	464191	464340	464489	464639	464787	464936	465085	465234
292	465383	465532	465680	465829	465977	466126	466274	466423	466571	466719
293	466868	467016	467164	467312	467460	467608	467756	467904	468052	468199
294	468347	468495	468643	468790	468798	469085	469233	469380	469527	469675
295	469822	469969	470116	470263	470410	470557	470704	470851	470998	471145
296	471292	471438	471585	471732	471878	472025	472171	472318	472464	472610
297	472756	472903	473049	473195	473341	473487	473633	473779	473925	474071
298	474216	474362	474508	474653	474799	474944	475089	475235	475381	475526
299	475671	475816	475962	476107	476252	476397	476542	476687	476832	476976
300	477121	477266	477411	477555	477699	477844	477989	478133	478278	478422

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303	481443	481586	481729	481872	482016	482159	482302	482445	482588	482731
304	482874	483016	483159	483302	483445	483587	483729	483872	484015	484157
305	484299	484442	484585	484727	484869	485011	485153	485295	485437	485579
306	485721	485863	486005	486147	486289	486430	486572	486714	486855	486997
307	487138	487279	487421	487563	487704	487845	487986	488127	488269	488409
308	488551	488692	488833	488974	489114	489255	489396	489537	489677	489818
309	489958	490099	490239	490379	490520	490661	490801	490941	491081	491222
310	491362	491502	491642	491782	491922	492062	492201	492341	492481	492621
311	492760	492900	493039	493179	493319	493458	493597	493737	493876	494015
312	494155	494294	494433	494572	494711	494850	494989	495128	495267	495406
313	495544	495683	495822	495960	496099	496238	496376	496515	496653	496791
314	496929	497068	497206	497344	497483	497621	497759	497897	498035	498173
315	498311	498448	498586	498724	498862	498999	499137	499275	499412	499549
316	499687	499824	499962	500099	500236	500374	500510	500648	500785	500922
317	501059	501196	501333	501470	501607	501744	501880	502017	502154	502291
318	502427	502564	502700	502837	502973	503109	503246	503382	503518	503655
319	503791	503927	504063	504199	504335	504471	504607	504743	504878	505014
320	505149	505286	505421	505557	505693	505828	505964	506099	506234	506369
321	506505	506640	506776	506911	507046	507181	507316	507451	507586	507721
322	507856	507991	508126	508260	508395	508529	508664	508799	508934	509068
323	509203	509337	509471	509606	509740	509874	510009	510143	510277	510411
324	510545	510679	510813	510941	511081	511215	511349	511482	511616	511749
325	511883	512017	512151	512284	512418	512551	512684	512818	512951	513084
326	513218	513351	513484	513617	513750	513883	514016	514149	514282	514415
327	514548	514681	514813	514946	515079	515211	515344	515476	515609	515741
328	515874	516006	516139	516271	516403	516535	516668	516799	516932	517064
329	517196	517328	517459	517592	517724	517855	517987	518119	518251	518382
330	518514	518646	518777	518909	519040	519171	519303	519434	519566	519697
331	519828	519959	520090	520221	520353	520484	520615	520745	520876	521007
332	521138	521269	521399	521530	521661	521792	521922	522053	522183	522314
333	522444	522575	522705	522835	522966	523096	523226	523356	523486	523616
334	523746	523876	524006	524136	524266	524396	524526	524656	524785	524915
335	525045	525174	525304	525434	525563	525693	525822	525951	526081	526210
336	526339	526469	526598	526727	526856	526985	527114	527243	527372	527501
337	527629	527759	527888	528016	528145	528274	528402	528531	528659	528788
338	528916	529045	529174	529302	529430	529559	529687	529815	529943	530072
339	530199	530328	530456	530584	530712	530839	530968	531096	531223	531351
340	531479	531607	531734	531862	531989	532117	532245	532372	532499	532627
341	532754	532882	533009	533136	533264	53339	533518	533645	533772	533899
342	534026	534153	534280	534407	534534	534661	534787	534914	535041	535167
343	535294	535421	535547	535674	535800	535927	536053	536179	536304	536432
344	536558	536685	536811	536937	537063	537189	537315	537441	537567	537693
345	537819	537945	538071	538197	538322	538448	538574	538699	538825	538951
346	539076	539202	539327	539452	539578	539703	539829	539954	540079	540204
347	540329	540455	540579	540705	540829	540955	541079	541205	541329	541454
348	541579	541704	541829	541953	542078	542203	542327	542452	542576	542701
349	542825	542949	543074	543199	543323	543447	543571	543696	543819	543944
350	544068	544192	544316	544440	544564	544688	544812	544924	545059	545183

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353	547775	547898	548021	548144	548267	548389	548512	548635	548758	548881
354	549003	549126	549249	549371	549494	549616	549739	549861	549984	550106
355	550228	550351	550473	550595	550717	550839	550962	551084	551206	551328
356	551449	551572	551694	551816	551938	552059	552181	552303	552425	552547
357	552668	552789	552911	553033	553155	553276	553398	553519	553640	553762
358	553883	554004	554126	554247	554368	554489	554610	554731	554852	554973
359	555094	555215	555336	555457	555578	555699	555819	555940	556061	556182
360	556303	556423	556544	556664	556785	556905	557626	557146	557267	557387
361	557507	557627	557748	557868	557988	558108	558228	558349	558469	558589
362	558709	558829	558948	559068	559188	559308	559428	559548	559667	559787
363	559907	560026	560146	560265	560385	560504	560624	560743	560863	560982
364	561101	561221	561339	561459	561578	561698	561817	561936	562055	562174
365	562293	562412	562531	562649	562769	562887	563006	563125	563244	563362
366	563481	563599	563718	563837	563955	564074	564192	564311	564429	564548
367	564666	564784	564903	565021	565139	565257	565376	565494	565612	565729
368	565848	565966	566084	566202	566319	566437	566555	566673	566791	566909
369	567026	567144	567262	567379	567497	567614	567732	567849	567967	568084
370	568202	568319	568436	568554	568671	568788	568905	569023	569139	569257
471	569374	569491	569608	569725	569842	569959	570076	570193	570309	570426
372	570543	570659	570776	570893	571009	571126	571243	571359	571476	571592
373	571709	571825	571942	572058	572174	572291	572407	572523	572639	572755
374	572872	572988	573104	573219	573336	573452	573568	573684	573799	573915
375	574031	574147	574263	574379	574494	574609	574726	574841	574957	575072
376	575188	575303	575419	575534	575649	575765	575880	575996	576111	576226
377	576341	576457	576572	576687	576802	576917	577032	577147	577292	577377
378	577492	577607	577722	577836	577951	578066	578181	578295	578409	578525
379	578639	578754	578868	578983	579097	579212	579326	579441	579555	579669
380	579784	579898	580012	580126	580241	580355	580469	580583	580697	580811
381	580925	581039	581153	581267	581381	581495	581608	581722	581836	581949
382	582063	582177	582291	582404	582518	582631	582745	582858	582972	583085
383	583199	583426	583312	583539	583652	583765	583879	583992	584105	584218
384	584331	584444	584587	584670	584783	584896	585009	585122	585235	585348
385	585461	585574	585686	585799	585912	586024	586137	586249	586362	586475
386	586587	586699	586812	586925	587037	587149	587262	587374	587486	587599
387	587711	587823	587935	588047	588159	588272	588384	588496	588608	588719
388	588832	588944	589056	589167	589279	589391	589503	589615	589726	589838
389	589949	590061	590173	590284	590396	590507	590619	590730	590842	590953
390	591065	591176	591287	591399	591509	591621	591732	591843	591955	592066
391	592177	592288	592399	192509	592621	592732	592843	592954	593064	593175
392	593286	593397	593508	593618	593729	593839	593950	594061	594171	594282
393	594393	594503	594614	594724	594834	594945	595055	595165	595276	595386
394	595496	595606	595717	595827	195937	596047	596157	596267	596377	596487
395	596597	596707	596817	596927	597037	597146	597256	597366	597476	597586
396	597695	597805	597914	598024	598134	598243	598353	598462	598572	598681
397	598790	598899	599009	599119	599228	599337	599446	599556	599665	599774
398	599883	599992	600101	600210	600319	600428	600537	600646	600755	600864
399	600973	601082	601191	601299	601408	601517	601625	601734	601843	601951
400	602059	602169	602277	602386	602494	602603	602819	602819	602928	603036

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402	604226	604334	604442	604550	604658	604766	604874	604982	605089	605197
403	605305	605413	605521	605628	605736	605844	605951	606059	606166	606274
404	606381	606489	606596	606704	606811	606919	607026	607133	607241	607348
405	607455	607562	607669	607777	607884	607991	608098	608205	608312	608419
406	608526	608633	608739	608847	608954	609061	609167	609274	609381	609488
407	609594	609701	609808	609914	610021	610128	610234	610341	610447	610554
408	610660	610767	610873	610979	611086	611192	611298	611405	611511	611617
409	611723	611829	611936	612042	612148	612254	612359	612466	612572	612678
410	612784	612889	612996	613102	613207	613313	613419	613525	613630	613736
411	613842	613947	614053	614159	614264	614369	614475	614581	614686	614792
412	614897	615003	615108	615213	615319	615424	615529	615634	615739	615845
413	615950	616055	616160	616265	616370	616476	616581	616686	616790	616895
414	617000	617105	617210	617315	617419	617525	617629	617734	617839	617943
415	618048	618153	618257	618362	618466	618571	618676	618780	618884	618989
416	619093	619198	619322	619406	619511	619615	619719	619824	619928	620032
417	620136	620240	620344	620448	620552	620656	620760	620864	620968	621072
418	621176	621280	621384	621448	621592	621695	621799	621902	622007	622110
419	622214	622317	622421	622525	622628	622732	622835	622939	623042	623146
420	623249	623353	623456	623559	623663	623766	623869	623973	624076	624179
421	624282	624385	624488	624591	624695	624798	624901	625004	625107	625209
422	625312	625415	625518	625621	625724	625827	625929	626 32	626135	626237
423	626340	626443	626545	626648	626751	626853	626956	627058	627161	627263
424	627366	627468	627571	627673	627775	627878	627979	628082	628185	628287
425	628389	628491	628593	628695	628797	628899	629002	629104	629206	629308
426	629409	629512	629613	629715	629817	629919	630021	630123	630224	630326
427	630428	630529	630631	630733	630835	630936	631038	631139	631241	631342
428	631444	631545	631647	631748	631849	631951	632052	632153	632255	632356
429	632457	632559	632659	632761	632862	632963	633064	633165	633266	633367
430	633468	633569	633670	633771	633872	633973	634074	634175	634276	634376
431	634477	634578	634679	634779	634880	634981	635081	635182	635283	635383
432	635484	635584	635685	635785	635886	635986	636087	636187	636288	636388
433	636488	636588	636688	636789	636889	636989	637089	637189	637289	637389
434	637489	637589	637689	637789	637889	637989	638089	638189	638289	638389
435	638489	638589	638689	638789	638888	638988	639088	639188	639287	639387
436	639486	639586	639686	639785	639885	639984	640084	640183	640283	640382
437	640481	640581	640680	640779	640879	640978	641077	641177	641276	641375
438	641475	641573	641672	641771	641871	641969	642069	642168	642267	642366
439	642465	642563	642662	642761	642860	642959	643058	643156	643255	643354
440	643453	643551	643650	643749	643847	643946	644044	644143	644242	644340
441	644439	644537	644636	644734	644832	644931	645029	645127	645226	645324
442	645422	645521	645619	645717	645815	645913	646011	646109	646208	646306
443	646404	646502	646599	646698	646796	646894	646992	647089	647187	647285
444	647383	647481	647579	647676	647774	647872	647969	648067	648165	648262
445	648360	648458	648555	648653	648750	648848	648945	649043	649140	649237
446	649335	649432	649529	649627	649724	649821	649919	650016	650113	650210
447	650308	650405	650502	650599	650696	650793	650890	650987	651084	651181
448	651278	651375	651472	651569	651666	651762	651859	651956	652053	652149
449	652246	652343	652439	652536	652633	652729	652826	652923	653019	653116
450	653213	653309	653405	653502	653598	653695	653791	653887	653983	654080

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452	655138	655235	655331	655427	655523	655619	655715	655810	655906	656002
453	656098	656194	656289	656386	656482	656577	656673	656769	656864	656960
454	657056	657152	657247	657343	657438	657534	657629	657725	657820	657916
455	658011	658107	658202	658298	658393	658488	658584	658679	658774	658869
456	658965	659060	659155	659250	659346	659441	659536	659631	659726	659821
457	659916	660011	660106	660201	660296	660391	660486	660581	660676	660771
458	660865	660960	661055	661149	661245	661339	661434	661529	661623	661718
459	661813	661907	662002	662096	662191	662286	662380	662475	662569	662663
460	662758	662852	662947	663041	663135	663229	663324	663418	663512	663607
461	663701	663795	663889	663983	664078	664172	664266	664359	664454	664548
462	664642	664736	664829	664924	665018	665112	665206	665299	665393	665487
463	665581	665675	665769	665862	665956	666049	666143	666237	666331	666424
464	666518	666611	666705	666799	666892	666986	667079	667173	667266	667359
465	667453	667546	667639	667733	667826	667919	668013	668106	668199	668293
466	668386	668479	668572	668665	668759	668852	668945	669038	669131	669224
467	669317	669409	669503	669596	669689	669782	669875	669967	676060	670153
468	670246	670339	670431	[illegible]	670617	670709	670802	670895	670988	671080
469	671173	671265	671358	671451	671543	671637	671728	671821	671913	632005
470	672098	672190	672283	672375	672467	672559	672652	672744	672836	672929
471	673021	673113	673205	673297	673389	673482	673574	673666	673758	673849
472	673942	674034	674126	674218	674309	674402	674494	674586	674677	674769
473	674861	674953	675045	675137	675228	675319	675412	675503	675595	675687
474	675778	675869	675962	676053	676145	676236	676328	676419	676511	676602
475	676694	676785	676876	676968	677059	677151	677242	677333	677424	677516
476	677607	677698	677789	677881	677972	678063	678154	678245	678335	678427
477	678518	678609	678700	678791	678882	678973	679064	679155	679246	979337
478	679428	679519	679609	679700	679791	679882	679972	680063	680154	680245
479	680336	680426	680517	680607	680698	680789	680879	680969	681060	681151
480	681241	681332	681422	681513	681603	681693	681784	681874	681964	682055
481	682145	682235	682326	682416	682506	682596	682686	282777	682867	682957
482	683047	683137	683227	683317	683407	683497	683587	683677	683767	683857
483	683947	684037	684127	684217	684307	684396	684486	684576	684666	684756
484	684845	684935	685025	685114	685204	685294	685383	685473	685563	685652
485	685742	685831	685921	686010	686099	686189	686279	686368	686458	686547
486	686636	686726	686815	646904	686994	687083	687172	687261	687351	687439
487	687529	687618	687707	687796	687885	687975	688064	688153	688242	688331
488	688419	688509	688598	688687	688776	688865	688953	689042	689131	689200
489	689309	689398	689486	689575	689664	689753	689841	689930	690019	690107
490	690196	690285	690373	690462	690550	690639	690728	690816	690905	690993
491	691081	691169	691258	691347	691435	691524	691612	691700	691789	691877
492	691965	692053	692142	[illegible]	692318	692406	692494	692583	692671	692759
493	692847	692935	693023	693111	693199	693287	693375	693463	693551	693639
494	693727	693815	693903	693991	694078	694166	694254	694342	694429	694517
495	694605	694693	694781	694868	694956	695044	695131	695219	695307	695394
496	695482	695569	695657	695744	695832	695919	696007	696094	696182	696269
497	696356	696445	696531	696618	696706	696793	696880	696968	697055	697142
498	697229	697317	697404	697491	697578	697665	697752	697839	697926	698014
499	698101	698188	698275	698362	698449	698535	698622	698709	698706	698883
500	698970	699057	699144	699231	699317	699404	699491	699578	699664	699751

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502	700704	700790	700877	700963	701049	701136	701222	701309	701395	701482
503	701568	701654	701741	701827	701913	701999	702086	702172	702258	702344
504	702430	702517	702603	702689	702775	702861	702947	703033	703119	703205
505	703291	703377	703463	703549	703635	703721	703807	703893	703979	704065
506	704151	704236	704322	704408	704494	704579	704665	704751	704837	704922
507	705008	705094	705179	705265	705350	705436	705522	705607	705693	705778
508	705864	705949	706035	706120	706206	706291	706376	706462	706547	706632
509	706718	706803	706888	706974	707059	707144	707219	707315	707399	707485
510	707570	707655	707740	707826	707911	707996	708081	708166	708251	708336
511	708421	708506	708591	708676	708761	708846	708931	709015	709100	709185
512	709269	709355	709439	709524	709609	709694	709779	709863	709948	710033
513	710117	710202	710287	710371	710456	710540	710625	710709	710794	710879
514	710963	711048	711132	711217	711301	711385	711469	711554	711639	711723
515	711807	711892	711976	712060	712144	712229	712313	712397	712481	712566
516	712649	712734	712818	712902	712986	713070	713154	713238	713323	713407
517	713491	713575	713659	713742	713826	713910	713994	714078	714162	714246
518	714329	714414	714497	714581	714665	714749	714833	714916	714999	715084
519	715167	715251	715335	715418	715501	715586	715669	715753	715836	715919
520	716003	716087	716170	716254	716337	716421	716504	716588	716671	716754
521	716838	716921	717004	717088	717171	717254	717338	717421	717504	717587
522	717671	717754	717837	717920	718003	718086	718169	718253	718336	718419
523	718502	718585	718668	718751	718834	718917	718999	719083	719165	719248
524	719331	719414	719497	719579	719663	719745	719828	719911	719994	720077
525	720159	720242	720325	720407	720490	720673	720655	720738	720821	720903
526	720986	721068	721151	721233	721316	721398	721481	721563	721646	721728
527	721811	721893	721975	722058	722140	722222	722305	722387	722469	722552
528	722634	722716	722798	722881	722963	723045	723127	723209	723291	723374
529	723456	723538	723619	723702	723784	723866	723948	724029	724112	724194
530	724276	724358	724439	724522	724604	724685	724767	724849	724931	725013
531	725095	725176	725258	725339	725422	725503	725585	725667	725748	725829
532	725912	725993	726075	726156	726238	726319	726401	726483	726564	726646
533	726727	726809	726890	726972	727053	727134	727216	727297	727379	727459
534	727541	727623	727704	727785	727866	727948	728029	728110	728191	728273
535	728354	728435	328516	728597	728678	728759	728841	728922	729003	729084
536	729165	729246	729327	729408	729489	729569	729651	729732	729813	729893
537	729974	730055	730136	730217	730298	730378	730459	730540	730621	730702
538	730782	730862	730944	731024	731105	731186	731266	731347	731428	731508
539	731589	731669	731749	731830	731911	731991	732072	732152	732233	732313
540	732394	732474	732555	732635	732715	732796	732876	732956	733037	733117
541	733197	733278	733358	733438	733518	733598	733679	733759	733839	733919
542	733999	734079	734159	734239	734319	734399	734479	734559	734639	734719
543	734799	734879	734959	735039	735119	735199	735279	735359	735439	735519
544	735599	735679	735759	735838	735918	735998	736078	736157	736237	736317
545	736397	736476	736556	736635	736715	736795	736874	736954	737034	737113
546	737192	737272	737352	737431	737511	737590	737669	737749	737829	737908
547	737987	738067	738146	738225	738305	738384	738463	738543	738622	738701
548	738781	738859	738939	739018	739097	739177	739256	739335	739414	739493
549	739572	739651	739731	739809	739885	739963	740047	740126	740205	740284
550	740363	740442	740521	740599	740678	740757	740836	740915	740994	741073

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552	741939	742018	742096	742175	742254	742332	742411	742489	742568	742647
553	742725	742801	742882	742961	743039	743118	743196	743275	743353	743431
554	743509	743588	743667	743745	743823	743902	743979	744058	744136	744215
555	744293	744371	744449	744528	744606	744684	744762	744840	744919	744997
556	745075	745153	745231	745309	745387	745465	745543	745621	745699	745777
557	745855	745933	746011	746089	746167	746245	746323	746401	746479	746556
558	746634	746712	746789	746868	746945	747023	747101	747179	747256	747334
559	747412	747489	747567	747645	747722	747800	747878	747955	748033	748110
560	748188	748266	748343	748421	748498	748576	748653	748731	748808	748885
561	748963	749040	749118	749195	749272	749349	749423	749504	749582	749659
562	749736	749814	749891	749963	750045	750123	750199	750277	750354	750431
563	750508	750586	750663	750739	750817	750894	750971	751048	751125	751202
564	751279	751356	751433	751510	751587	751664	751741	751818	751895	751972
565	752048	752125	752202	752279	752356	752433	752509	752586	752663	752739
566	752816	752893	752969	753047	753123	753199	753277	753353	753429	753506
567	753583	753659	753736	753813	753889	753966	754042	754119	754195	754272
568	754348	754425	754501	754578	754654	754730	754807	754883	754959	755035
569	755112	755189	755265	755341	755417	755494	755569	755646	755722	755799
570	755875	755951	756027	756103	756179	756256	756332	756408	756484	756560
571	756636	756712	756788	756864	756940	757016	757092	757168	757244	757320
572	757396	757472	757548	757627	757699	757775	757851	757927	758003	758079
573	758155	758230	758306	758382	758458	758533	758609	758685	758761	758836
574	758912	758988	759063	759139	759214	759290	759366	759441	759517	759592
576	759668	759743	759819	759894	758969	760045	760121	760196	760272	760347
576	760422	760498	760573	760649	760723	760799	760875	760949	761025	761101
577	761176	761251	761326	761402	761477	761552	761627	761702	761778	761853
578	761928	762003	762078	762153	762228	762303	762378	762453	762529	762604
579	762679	762754	762829	762904	762978	763053	763128	763203	763279	763353
580	763428	763503	763578	763653	763727	763802	763877	763952	764027	764101
581	764176	764251	764326	764400	764475	764549	764624	764699	764774	764808
582	764923	764998	765072	765147	765221	765296	765370	765445	765519	765594
583	765669	765743	765818	765892	765966	766041	766115	766189	766264	766338
584	766413	766487	766562	766636	766710	766785	766859	766933	767007	767082
585	767156	767230	767304	767379	767453	767527	767601	767675	767749	767823
586	767898	767972	768046	768119	768194	768268	768342	768416	768490	768564
587	768638	768712	768786	768860	768934	769008	769082	769156	769229	769303
588	769377	769451	769525	769599	769673	769746	769820	769894	769968	770042
589	770115	770189	770263	770336	770410	770484	770557	770631	770705	770778
590	770852	770926	770999	771073	771146	771219	771293	771367	771440	771514
591	771587	771661	771734	771808	771881	771955	772028	772102	772175	772248
592	772322	772395	772468	772542	772615	772688	772762	772835	772908	772981
593	773055	773128	773201	773274	773348	773421	773494	773567	773640	773713
594	773786	773859	773933	774006	774079	774152	774225	774298	774371	774444
595	774517	774589	774663	774736	774809	774882	774955	775028	775100	775173
596	775246	775319	775392	775465	775538	775610	775683	775756	775829	775902
597	775974	776047	776119	776193	776265	776338	776411	776483	776556	776629
598	776701	776774	776846	776919	776992	777064	777137	777209	777282	777354
599	777427	777499	777572	777644	777717	777789	777862	777934	778006	778079
600	778151	778224	778296	778368	778441	778513	778585	778658	778729	778802

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602	779596	779669	779741	779813	779885	779957	780029	780101	780173	780245
603	780317	780389	780461	780533	780605	780677	780749	780821	780893	780963
604	781037	781109	781181	781253	781324	781396	781468	781539	781612	781684
605	781755	781827	781899	781971	782042	782114	782186	782258	782329	782401
606	782473	782544	782616	782688	782759	782831	782902	782974	783046	783117
607	783189	783260	783332	783403	783475	783546	783618	783689	783761	783832
608	783904	783975	784046	784118	784189	784261	784332	784403	784475	784546
609	784617	784689	784759	784831	784902	784974	785045	785116	785187	785259
610	785329	785401	785472	785543	785615	785686	785757	785828	785899	785970
611	786041	786112	786183	786254	786325	786396	786467	786538	786609	786680
612	786751	786822	786893	786964	787035	787106	787177	787248	787319	787389
613	787460	787531	787602	787673	787744	787815	787885	787956	788027	788098
614	788164	788239	788309	788381	788451	788522	788593	788663	788734	788804
615	788875	788946	789016	789087	789157	789228	789299	789369	789439	789510
616	789581	789651	789722	789792	789863	789933	790004	790074	790144	790215
617	790285	790356	790426	790496	790567	790637	790707	790778	790848	790918
618	790988	791059	791129	791199	791269	791339	791409	791480	791550	791620
619	791691	791761	791831	791901	791971	792041	792111	792181	792252	792322
620	792392	792462	792532	792602	792672	792742	792812	792882	792952	793022
621	793092	793162	793231	793301	793371	793441	793511	793581	793651	763721
622	793791	793860	793930	793999	794069	794139	794209	794279	794349	794418
623	794488	794558	794627	794697	794767	794836	794906	794976	795045	795115
624	795185	795254	795324	795393	795463	795532	795602	795672	795741	795810
625	795880	795949	796019	796088	796158	796227	796297	796366	796436	796505
626	796574	796644	796713	796782	796852	796921	796990	797059	797129	797198
627	797268	797337	797406	797475	797545	797614	797683	797752	797821	797890
628	797959	798029	798098	798167	798236	798305	798374	798443	798513	798582
629	798651	798719	798789	798858	798927	798996	799065	799134	799003	799272
630	799341	799409	799478	799547	799616	799685	799754	799823	799892	799961
631	800029	800098	800167	800236	800305	800373	800442	800511	800579	800648
632	800717	800786	800854	800923	800992	801061	801129	801198	801266	801335
633	801404	801472	801541	801609	801678	801747	801815	801884	801952	802021
634	802089	802158	802226	802295	802363	802432	802500	802568	802637	802705
635	802774	802842	802910	802979	803047	803116	803184	803252	803321	803389
636	803457	803525	803594	803662	803730	803798	803867	803935	804003	804071
637	804139	804208	804276	804344	804412	804480	804548	804616	804685	804753
638	804821	804889	804957	805025	805093	805161	805229	805297	806365	805433
639	805501	805569	805637	805705	805773	805841	805908	805976	806044	806112
640	806179	806248	806316	806384	806451	806519	806587	806655	806723	806790
641	806858	806926	806994	807061	807129	807197	807264	807332	807399	807467
642	807535	807603	807670	807738	807806	807873	807941	808008	808076	808143
643	808211	808279	808346	808414	808481	808549	808616	808684	808751	808818
644	808886	808953	809021	809088	809156	809223	809290	809358	809425	809492
645	809559	809627	809694	809762	809829	809896	809964	810031	810098	810165
646	810233	810299	810367	810434	810501	810569	810636	810703	810770	810837
647	810904	810971	811039	811106	811173	811239	811307	811374	811441	811508
648	811575	811642	811709	811776	811843	811909	811977	812044	812111	812178
649	812245	812312	812379	812445	812512	812579	812646	812713	812779	812847
650	812913	812980	813047	813114	813181	813247	813314	813381	813448	813514

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652	814248	814314	814381	814447	814514	814581	814647	814714	814780	814847
653	814913	814979	815046	815113	815179	815246	815312	815378	815445	815511
654	815578	815644	815711	815777	815843	815909	815976	816042	816109	816175
655	816241	816308	816374	816440	816506	816573	816639	816705	816771	816838
656	816904	816970	817036	817102	817169	817235	817301	817367	817433	817499
657	817565	817631	817698	817764	817829	817896	817962	818028	818094	818159
658	818226	818292	818358	818424	818489	818556	818622	818688	818754	818819
659	818885	818951	819017	819083	819149	819215	819281	819346	819412	819478
660	819543	819609	819676	819741	819807	819873	819939	820004	820070	820136
661	820201	820267	820333	820399	820464	820529	820595	820661	820727	820792
662	820858	820924	820989	821055	821120	821186	821251	821317	821382	821448
663	821514	821579	821645	821709	821775	821841	821906	821972	822037	822103
664	822168	822233	822299	822364	822429	822495	822560	822626	822691	822756
665	822822	822887	822952	823018	823083	823148	823213	823279	823344	823409
666	823474	823539	823605	823669	823735	823800	823865	823930	823996	824061
667	824126	824191	824256	824321	824386	824451	824516	824581	824646	824711
668	824776	824841	824906	824971	825036	825101	825166	825231	825296	825361
669	825426	825491	825556	825621	825686	825751	825815	825880	825945	826009
670	826075	826139	826204	826269	826334	826399	826464	826528	826593	826658
671	826723	826787	826852	826917	826981	827046	827111	827175	827239	827305
672	827369	827434	827499	827563	827628	827692	827757	827822	827886	827951
673	828015	828079	828144	828209	828273	828338	828402	828467	828531	828595
674	828659	828724	828789	828853	828918	828982	829046	829111	829175	829239
675	829304	829368	829432	829497	829561	829625	829689	829754	829818	829882
676	829947	830011	830075	830139	830204	830268	830332	830396	830460	830525
677	830589	830653	830717	830781	830845	830909	830973	831037	831102	831166
678	831229	831294	831358	831422	831485	831549	831614	831678	831742	831806
679	831869	831934	831998	832062	832126	832189	832253	832317	832381	832445
680	832509	832573	832636	832700	832764	832828	832892	832956	833019	833083
681	833147	833211	833275	833338	833402	833466	833529	833593	833657	833721
682	833784	833848	833912	833975	834039	834103	834166	834229	834294	834357
683	834421	834584	834548	834611	834675	834739	834802	834866	834929	834993
684	835056	835119	835183	835247	835310	835373	835437	835500	835564	835627
685	835691	835754	835817	835881	835944	836007	836071	836134	836197	836261
686	836324	836387	836451	836514	836577	836641	836704	836767	836830	836894
687	836957	837019	837083	837146	837209	837273	837336	837399	837462	837525
688	837588	837652	837715	837777	837841	837904	837967	838030	838093	838156
689	838219	838282	838345	838408	838471	838534	838597	838660	838723	838786
690	838849	838912	838975	839038	839101	839164	839227	839280	839352	839415
691	839478	839541	839604	839667	839729	839792	839855	839918	839981	840043
692	840106	840169	840232	840204	840357	840419	840482	840545	840608	840671
693	840733	840796	840859	840921	840984	841049	841109	841172	841234	841297
694	841359	841423	841485	841547	841609	841672	841735	841797	841859	841922
695	841985	842047	842109	842172	842235	842297	842359	842432	842484	842547
696	842609	842672	842734	842796	842859	842921	842983	843046	843108	843170
697	843233	843295	843357	843419	843482	843544	843606	843669	843731	843793
698	843855	843918	843979	844042	844104	844166	844229	844291	844353	844415
699	844477	844539	844601	844664	844726	844788	844849	844912	844974	845036
700	845098	845160	845222	845284	845346	845408	845470	845532	845594	845656

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702	846337	846399	846461	846523	846585	846646	846708	846769	846832	846894
703	846955	847017	847079	847141	847202	847264	847326	847388	847449	847511
704	847573	847634	847696	847758	847819	847881	847943	848004	848067	848128
705	848189	848251	848312	848374	848435	848497	848559	848620	848682	848743
706	848805	848866	848928	848989	849051	849112	849171	849235	849297	849358
707	849419	849481	849542	849604	849665	849726	849788	849849	849911	849972
708	850033	850095	850156	850217	850279	850339	850401	850462	850524	850585
709	850646	850707	850769	850829	850891	850952	851014	851075	851136	851197
710	851258	851319	851381	851442	851503	851564	851625	851686	851747	851809
711	851869	851931	851992	852053	852114	852175	852236	852297	852358	852419
712	852479	852541	852602	852663	852724	852785	852846	852907	852968	853029
713	853089	853150	853211	853272	853333	853394	853455	853516	853577	853637
714	853698	853759	853819	853881	853941	854002	854063	854124	854185	854245
715	854306	854367	854428	854488	854549	854609	854670	854731	854792	854852
716	854913	854974	855034	855095	855156	855216	855277	855337	855398	855459
717	855519	855579	855640	855701	855761	855822	855882	855943	856003	856064
718	856124	856185	856245	856306	856366	856427	856487	856548	856608	856668
719	856729	856789	856849	856910	856970	857031	857091	857152	857212	857272
920	857332	857393	857453	857513	857574	857634	857694	857755	857815	857875
721	857935	857995	858056	858116	858176	858236	858297	858357	858417	858477
722	858537	858597	858657	858718	858778	858838	858898	858958	859018	859078
723	859138	859198	859258	859318	859379	859439	859499	859559	859619	859679
724	859739	859799	859859	859918	859978	860038	860098	860158	860218	860278
725	860338	860398	860458	860518	860578	860637	860697	860757	860817	860877
726	860937	860996	861056	861116	861176	861236	861295	861355	861415	860475
727	861534	861594	861654	861714	861773	861733	861893	861952	862012	862072
728	862131	862191	862251	862310	862369	862429	862489	862549	862608	862662
729	862728	862787	862847	862906	862966	863025	863085	863144	863204	863263
730	863323	863382	863442	863501	863561	863620	863679	863739	863799	863858
731	863917	863977	864036	864096	864155	864214	864274	864333	864392	864452
732	864511	864570	864629	864689	864748	864808	864867	864926	864985	865045
733	865104	865163	865222	865282	865341	865400	865459	865519	865578	865637
734	865696	865755	865814	865874	865933	865992	866051	866110	866169	866228
735	866287	866346	866405	866465	866524	866583	866642	866701	866759	866819
736	866878	866937	866996	867055	867114	867173	867232	867291	867349	867409
737	867467	867526	867585	867644	867703	867762	867821	867879	867939	867998
738	868056	868115	868174	868233	868292	868350	868409	868468	868527	868586
739	863643	868704	868762	868821	868879	868938	868997	869056	869114	869173
740	869232	869290	869349	869408	869466	869525	869584	869642	869701	869759
741	869818	869877	869935	869994	870053	870111	870169	870228	870287	870345
742	870404	870462	870521	870579	870638	870696	870755	870813	870872	870930
743	870989	871047	871106	871164	871223	871281	871339	871398	871456	871515
744	871573	871631	871689	871748	871806	871865	871923	871981	872039	872098
745	872156	872215	872273	872331	872389	872448	872506	872564	872622	872681
746	872739	872797	872855	872913	872972	873029	873088	873146	873204	873262
747	873321	873379	873437	873495	873553	873611	873669	873727	873785	873844
748	873902	873959	874018	874076	874134	874192	[illegible]	874308	874366	874424
749	874482	874539	874598	874656	874714	874772	[illegible]	874888	874945	875003
750	875061	875119	875177	875235	875293	875351	[illegible]	875466	875524	875582

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753	876795	876853	876910	876968	877026	877083	877141	877199	877256	877314
754	877371	877429	877487	877544	877602	877659	877717	877774	877832	877889
755	877947	878004	878062	878119	878177	878234	878292	878349	878407	878464
756	878522	878579	878637	878694	878752	878809	878866	878924	878981	879039
757	879096	879153	879211	879268	879325	879383	879439	879497	879555	879612
758	879669	879726	879784	879841	879898	879013	870013	880070	880127	880185
759	880242	880299	880356	880413	880471	880527	880585	880642	88 699	880756
760	880814	880871	880928	880985	881042	881099	881156	881213	881271	881328
761	881385	881442	881499	881556	881613	881669	881727	881784	881841	881898
762	881955	882012	882069	882126	882183	882239	882297	882354	882411	882468
763	882525	882581	882638	882695	882752	882809	882866	882923	882979	883037
764	883 93	883050	883207	8 3264	883321	883377	883434	883494	883548	883605
765	883661	883718	883775	883832	883888	883945	884002	884059	884115	884172
766	884229	884 85	884342	884399	884455	884512	884569	884625	884682	884739
767	884795	884852	884909	884965	885022	885078	885135	885192	885248	885305
768	885361	885418	885474	885531	885587	885644	885700	885757	885813	885869
769	885926	885983	886039	886096	886152	886209	886265	886321	886378	886434
770	886491	886547	886604	886659	886716	886772	886829	886885	886941	886998
771	887054	887111	887167	887223	887279	887336	887392	887449	887505	887561
772	887617	887674	887729	887786	887842	887898	887955	888011	888067	888123
773	888179	888236	888291	888348	888404	888460	888516	888573	888629	888685
774	888741	888797	888853	888909	888965	889021	889077	889134	889189	889246
775	889302	889358	889414	889469	889526	889582	889638	889694	889749	889806
776	889862	889918	889974	890029	890086	890141	890197	890253	890309	890365
777	890421	890477	890533	890589	890645	890700	890756	890812	890868	890924
778	890979	891035	891091	891147	891203	891259	891314	891370	891426	891482
779	891537	891593	891649	891705	891760	891816	891872	891928	891983	892039
780	892095	892150	892206	892262	892317	892373	892429	892484	892539	892595
781	892651	892707	892762	892819	892873	892929	892985	893040	893096	893151
782	893207	893262	893318	893373	893429	893484	893539	893595	893651	893706
783	893762	893817	893873	893928	893984	894039	894094	894149	894205	894261
784	894316	894371	894427	894482	894538	894593	894648	894704	894759	894814
785	894869	894925	394980	895036	895091	895146	895201	895257	895312	895367
786	895423	895478	895533	895588	895644	895699	895754	895809	895864	895919
787	895975	896029	896085	896140	896195	896251	896306	896361	896416	896471
788	896526	896581	896636	896692	896747	896802	896857	896912	896967	897022
789	897077	897132	897187	897242	897297	897352	897407	897462	897517	897572
790	897627	897682	897737	897792	897847	897902	897957	898012	898067	898122
791	898176	898231	898286	898341	898396	898451	898506	898561	898615	898670
792	898725	898780	898835	898889	898944	898999	899054	899109	899164	899218
794	899273	899328	899383	899437	899492	899547	899602	899656	899711	899766
793	899821	899875	899929	899985	900039	900394	9 0149	900203	900258	900312
795	900367	900422	900476	900531	900586	900640	900695	900749	900804	900859
796	900913	900968	901022	901077	901131	901186	901240	901295	901349	901404
797	901458	901513	901567	901622	901676	901731	901785	901839	901894	901948
798	902003	902057	902112	902166	902221	902275	902329	902384	902438	902492
799	902547	902601	902655	902709	902764	902818	902873	902927	902981	903036
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The Table of *Logarithmes*.

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801	903633	903687	903741	903795	903849	903904	903956	904012	904066	904120
802	904174	904229	904283	904337	904391	904445	904499	904553	904607	904661
803	904716	904769	904824	904878	904932	904986	905039	905094	905148	905202
804	905256	905310	905364	905418	905472	905526	905580	905634	905688	905742
805	905796	905849	905904	905958	906012	906066	909119	906173	906227	906281
806	906335	906389	906443	906497	906551	906604	996658	906712	906766	906819
807	906874	906927	907981	907035	907089	907143	907196	907250	907304	907358
808	907411	907465	907519	907573	907626	907680	907734	907787	907841	907895
809	907949	908002	908056	908109	908163	908217	908270	908324	908378	908431
810	908485	908539	908592	908646	908699	908753	908807	908860	908914	908967
811	909021	909074	909128	909181	909235	909289	909342	909396	909449	909503
812	909556	909609	909663	909716	909769	909823	909877	909930	909984	910037
813	910091	910144	910197	910251	910304	910358	910411	910464	910518	910571
814	910624	910678	910731	910784	910838	910891	910944	910998	911051	911104
815	911158	911211	911263	911317	911371	911424	911477	911530	911584	911637
816	911690	911743	911797	911849	911903	911956	912009	912063	912116	912169
817	912222	912275	912323	912381	912435	912488	912541	912594	912647	912700
818	912753	912806	912859	912913	912966	913019	913072	913125	913178	913231
819	913284	913337	913389	913443	913496	913549	913602	913655	913708	913761
820	913814	913867	913919	913973	914026	914079	914132	914184	914237	914290
821	914343	914396	914449	914502	914555	914608	914660	914713	914766	914819
822	914872	914925	914977	915030	915083	915136	915189	915241	915294	915347
823	915399	915453	915505	915558	915611	915664	915716	915769	915822	915874
824	915927	915979	916033	916085	916138	916191	916243	916296	916349	916401
825	916454	916507	916559	916612	916664	916717	916769	916822	916875	916927
826	916980	917033	917085	917138	917190	917243	917295	917348	917400	917453
827	917506	917558	917611	917663	917716	917768	917820	917873	917925	917978
828	918030	918083	918135	918188	918240	918293	918345	918397	918449	918502
829	918555	918607	918659	918712	918764	918816	918869	918921	918973	919026
830	919078	919130	919183	919235	919287	919339	919392	919444	919496	919549
831	919601	919653	919706	919758	919810	919862	919914	919967	920019	920071
832	920123	920176	920228	920279	920332	920384	920436	920489	920541	920593
833	920645	920697	920749	920801	920853	920906	920958	921009	921062	921114
834	921166	921218	921270	921322	921374	921426	921478	921530	921582	921634
835	921686	921738	921790	921842	921894	921946	921998	922050	922102	922154
836	922206	922258	922310	922362	922414	922466	922518	922569	922622	922674
837	922725	922777	922829	922881	922933	922985	923037	923089	923140	923192
838	923244	923296	923348	923399	923451	923503	923555	923607	923658	923710
839	923762	923814	923865	923917	923969	924021	924072	924124	924176	924228
840	924279	924331	924383	924434	924486	924538	924589	924641	924693	924744
841	924796	924848	924899	924951	925003	925054	925106	925157	925209	925261
842	925312	925364	925415	925467	925518	925569	925621	925673	925725	925776
843	925828	925879	925931	925982	926034	926085	926137	926188	926239	926291
844	926342	926394	926445	926497	926548	926599	926651	926702	926754	926805
845	926857	926908	926959	927011	927062	927114	927165	927216	727268	927319
846	927370	927422	927473	927524	927576	927627	927678	927729	927781	927832
847	927883	927935	927986	928037	928088	928139	928191	928242	928293	928345
848	928396	928447	928498	928549	928601	928652	928703	928754	928805	928857
849	928908	928959	929009	829061	929112	929163	929215	929266	929317	929368
850	929419	929470	929521	929572	929623	929674	929725	929776	929827	929879

The Table of *Logarithmes*.

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852	930439	930491	930542	930592	930643	930694	930745	930796	930847	930898
853	930949	930999	931051	931102	931153	931204	931254	931305	931356	931407
854	931458	931509	931559	931610	931661	931712	931763	931814	931865	931915
855	931966	932017	932068	932118	932169	932220	932271	932322	932372	932423
856	932474	932524	932575	932626	932677	932727	932778	932829	932879	932930
857	932981	933031	933082	933133	933183	933234	933285	933335	933386	933437
858	933487	933539	933589	933639	933689	933740	933791	933841	933892	933943
859	933993	934044	934094	934145	934195	934246	934296	934347	934397	934448
860	934498	934549	934599	934649	934700	934751	934801	934852	934902	934953
861	935003	935056	935104	935154	935205	935255	935306	935356	935406	935457
862	935507	935558	935608	935658	935709	935759	935809	935859	935910	935960
863	936011	936061	936111	936162	936212	936262	936313	936363	936413	936463
864	936514	936564	936614	936665	936715	936765	936815	936815	936916	936966
865	937016	937066	937117	937167	937217	937268	937327	937367	937418	937468
866	937518	937568	937618	937668	937718	937769	937819	937869	937919	937969
867	938019	938069	938119	938169	938219	938269	938319	938369	938419	938469
868	938519	938569	938619	938669	938719	938769	938819	938869	938919	938969
869	939019	939069	939114	939169	939219	939269	939319	939369	939419	939469
870	939519	939569	939619	939669	939719	939769	939819	939869	939919	939969
871	940018	940068	940188	940168	940218	940267	940317	940367	940417	940467
872	940516	940566	940616	940666	940716	940765	940813	940865	940915	940964
873	941014	941065	941114	941663	941213	941263	941313	941362	941412	941462
874	941511	941561	941611	941660	941710	941759	941809	941859	941909	941958
875	942008	942058	942107	942157	942207	942256	942306	942355	942405	942455
876	942504	942554	942603	942653	942702	942752	942801	942851	942901	942950
877	942999	943049	943099	943148	943198	943247	943297	943346	943396	943445
878	943495	943544	943594	943643	943692	943742	943791	943841	943890	943939
879	943989	944038	944088	944137	944186	944236	944285	944335	944384	944433
880	944483	944532	944581	944631	944680	944729	944779	944828	944877	944927
881	944976	945025	945074	945124	945173	945222	945272	945321	945370	945419
882	945468	945518	945567	945616	945665	945715	945764	945813	945862	945912
883	945961	946009	946054	946108	946157	946207	946256	946305	946354	946403
884	946452	946501	946551	946599	946649	946698	946747	946796	946845	946894
885	946943	946992	947041	947090	947139	947189	947238	947287	947336	947385
886	947434	947483	947532	947581	947629	947679	947728	947777	947826	947875
887	947924	947973	948022	948070	948119	948168	948217	948266	948315	948364
888	948413	948462	948511	948559	948609	948657	948706	948755	948804	948853
889	948902	948951	948999	949048	949097	949146	949195	949244	949292	949341
890	949390	949439	949488	949536	949585	949633	949683	949731	949780	949829
891	949878	949926	949975	950024	950073	950121	950170	950219	950267	950316
892	950365	950414	950462	950511	950559	950608	950657	950706	950754	950803
893	950851	950900	950949	950997	951046	951095	951143	951192	951240	951289
894	951338	951386	951435	951483	951532	951580	951629	951677	951729	951775
895	951823	951872	951920	951969	952017	952066	952114	952163	952211	952259
896	952308	952356	952405	952453	952502	952550	952599	952647	952696	952744
897	952792	952841	952889	952938	952986	953034	953083	953131	953179	953228
898	953276	953325	953373	953421	953469	953518	953566	953615	953663	953711
899	953759	953808	953856	953905	953953	954001	954049	954099	954146	954194
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902	955207	955255	955303	955351	955399	955447	955495	955543	955592	955639
903	955688	955736	955784	955832	955880	955928	955976	956024	956072	956120
904	956168	956216	956265	956313	956361	956409	956457	956505	956553	956601
905	956640	956697	956745	956793	956840	956888	956936	656984	957032	957080
906	957128	957176	957224	957272	957319	957368	957716	957464	957512	957559
907	957607	957655	957703	957751	957799	957847	957894	957942	957990	958038
908	958086	958134	958181	958229	958277	958325	958373	958421	958468	958516
909	958564	958612	958659	958707	958755	958803	958850	958898	958946	958994
910	959041	959089	959137	959185	959232	959279	959328	959375	959423	959471
911	959518	959566	959614	959661	959709	959757	959804	959852	959899	959947
912	959995	960042	960090	960138	960185	960233	960280	960328	960376	960423
913	960471	960518	960566	960613	960661	960709	960756	960804	960851	960899
914	960946	960994	961041	961089	961136	961184	961231	961279	961326	961374
915	961421	961469	961516	961563	961611	961658	961706	961753	961801	961848
916	961895	961943	961990	962038	962085	962132	962179	962227	962275	962322
917	962369	962417	962464	962511	962559	962606	962653	962701	962748	962795
918	962842	962889	962937	962985	963032	963079	963126	963174	963228	963268
919	963315	963363	963410	963457	963504	963552	963599	963646	963693	963741
920	963788	963835	963882	963929	963977	964024	964071	964118	964165	964212
921	964259	964307	964354	964401	964448	964495	964542	964589	964637	964684
922	964731	964778	964825	964872	964919	964966	965013	965061	965108	965156
923	965202	965249	965296	965343	965389	965437	965484	965531	965578	965624
924	965672	965719	965766	965813	965859	965906	965954	966001	966048	966096
925	966142	966189	966239	956283	966329	966376	966423	966470	966517	966564
926	966611	966658	966705	966752	966799	966845	966892	966939	966986	967033
927	967079	967127	967173	967220	967267	967314	967361	967408	967454	967501
928	967548	967595	967642	967688	967735	967782	967829	967875	967922	967969
929	968016	968062	968109	968156	968202	968249	968296	968343	968389	968436
930	968483	968529	968576	968623	968669	968716	968763	968809	968856	968902
931	968949	968996	969043	969089	969136	969183	969229	969276	969323	969369
932	969416	969463	969509	969556	969602	969649	969695	969741	969789	969835
933	969882	969928	969975	970021	970068	970114	970161	970207	970254	970300
934	970347	970393	970439	970486	970533	970579	970626	970672	970719	970765
935	970812	970858	970904	970951	970997	971044	971090	971137	971183	971229
936	971276	971322	971369	971416	971461	971508	971554	971601	971647	971653
937	971739	971786	971832	971879	971925	971971	972018	972064	972110	972157
938	972203	972249	972295	972342	972388	972434	972481	972527	972573	972619
939	972666	972712	972758	972804	972851	972897	972943	972989	973036	973082
940	973128	973174	973220	973266	973313	973359	973405	973451	973497	973543
941	973589	973636	973682	973728	973774	973820	973866	973913	973959	974005
942	974050	974097	974143	974189	974235	974281	974327	974374	974419	974466
943	974512	974558	974604	974649	974695	974742	974788	974834	974879	974926
944	974972	975018	975064	975109	975156	975202	975248	975294	975339	975386
945	975432	975478	975524	975569	975616	975662	975707	975753	975799	975845
946	975891	975937	975983	976029	976075	976121	976167	976212	976258	976304
947	976349	976396	976442	976488	976533	976579	976625	976671	976717	976763
948	976808	976854	975899	976946	976992	977037	977083	977129	977175	977220
949	977266	977312	977358	977403	977449	977495	977541	977586	977632	977678
950	977724	977769	977815	977861	977906	977952	977008	978042	978089	978135

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953	979093	979138	979184	979229	979275	979321	979366	979412	979457	979503
954	979548	979594	979639	979685	979730	979776	979821	979867	979912	979958
955	980003	980049	980094	980139	980185	980231	980276	980322	980367	980412
956	980458	980503	980549	980594	980639	980685	980730	980776	980821	980867
957	980912	980957	981003	981048	981093	981139	981184	981229	981275	981320
958	981366	981411	981456	981501	981547	981592	981637	981683	981728	981773
959	981819	981864	981909	981954	981999	982045	982090	982135	982181	982226
960	982271	982316	982362	982407	982452	982497	982543	982588	982633	982678
961	982723	982767	982814	982859	982904	982949	982994	983039	983085	983129
962	983175	983220	983265	983310	983356	983401	983446	983490	983536	983581
963	983626	983671	983716	983762	983807	983852	983897	983942	983987	984032
964	984077	984122	984167	984212	984257	984302	984347	984392	984437	984482
965	984527	984572	984617	984662	984707	984752	984797	984842	984887	984932
966	984977	985022	985067	985112	985157	985202	985247	985292	985337	985382
967	985426	985471	985516	985561	985606	985651	985696	985741	985786	985830
968	985875	985920	985965	986009	986055	986099	986144	986189	986234	986279
969	986324	986369	986413	986458	986504	986548	986593	986637	986682	986727
970	986772	986817	986861	986906	986951	986996	987040	987085	987129	987175
971	987219	987264	987309	987353	987398	987443	987488	987532	987577	987622
972	987666	987711	987756	987800	987845	987889	987934	987979	988024	988068
973	988113	988157	988202	988247	988291	988336	988381	988425	988469	988514
974	988559	988604	988648	988693	988737	988782	988826	988871	988916	988960
975	989005	989049	989094	989138	989183	989227	989272	989316	989361	989405
976	989449	989494	989539	989584	989628	989672	989717	989761	989806	989850
977	989895	989939	989983	990028	990072	990117	990161	990206	990250	990294
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979	990783	990827	990871	990916	990960	991004	991049	991093	991137	991182
980	991226	991270	991315	991359	991403	991448	991492	991536	991580	991625
981	991669	991713	991758	991802	991846	991890	991935	991979	992023	992067
982	992111	992156	992109	992244	992288	992333	992377	992421	992465	992509
983	992554	992598	992642	992686	992730	992774	992819	992863	992907	992951
984	992995	993039	993083	993127	993172	993216	993259	993304	993348	993392
985	993436	993480	993524	993568	993613	993657	993701	993745	993789	993833
986	993877	993921	993965	994009	994053	994097	994141	994185	994229	994273
987	994317	994361	994405	994449	994493	994537	994581	994625	994669	994713
988	994756	994801	994845	994889	994933	994977	995021	995065	995108	995152
989	995196	995240	995284	995328	995372	995416	995459	995504	995547	995591
990	995635	995679	995723	995764	995811	995854	995898	995942	995986	996029
991	996074	996117	996161	996205	996249	996293	996337	996380	996424	996468
992	996512	996555	996599	996643	996687	996731	996774	996818	996862	996906
993	996949	996993	997037	997080	997124	997168	997212	997255	997290	997343
994	997386	997430	997474	997517	997561	997605	997648	997692	997736	997779
995	997823	997867	997910	997954	997998	998041	998085	998129	998172	998216
996	998259	998303	998347	998390	998434	998477	998521	998564	998608	998652
997	998695	998739	998783	998826	998869	998913	998956	998999	999043	999087
998	999133	999174	999218	999261	999305	999348	999392	999435	999479	999522
999	999565	999609	999652	999696	999739	999783	999826	9998[illegible]	999913	999956
1000	000000	000043	000087	000130	000174	000217	000260	000304	000347	000391

FINIS.

Mr ... John Gadbury in his almanack for ye year 1666 doth ... of those tables
as also of those printed in the doctrin of the nativitie & of ye Rodolphine Philolaick
Danish tables & of those in Astronomia instaurata but both we & Mr Wing as it seems
by him there doth utterly condemn ye Carolina tables to be so erroneous & false as not
fitting to be used . as they are now printed 1666

CHAP. XXIX

To finde the Parallax of the Moon *from the* Sun *in Altitude, according to the Doctrine of the second Book 22 Chapter.*

AT the apparent time of the true Conjunction, before mentioned, the Distance of the Sun from the Zenith is 43d 37′ 0″, and the Distance of the Moon from the Zenith 43d 16′ 22″, also the Distance of the Sun from the Earth is 101302 and the Distance of the Monn 3981, (the Semidiameter of the Earth being 68½) which given, the Operation is as followeth.

In the Sun.			In the Moon.		
	101302.0			39810	
	68.5			68.5	
Summe	101370.5	5,00591	Summe	4049.5	3,60740
Difference	101213.5	5,00532	Difference	3912.5	3,59245
Tangent of	68d 11′ 30″,	10,39779	Tangent of	68d 21′ 49″,	10,40158
Tangent of	68 9 54:	10,39720	Tangent of	67 40 45:	10,38663
Difference	1 36		Difference	41 4	

Parallax of the Moon in Altitude.	41′ 4″
Parallax of the Sun in Altitude substract.	1 36
Parallax of the Moon from the Sun in Altitude.	39 28

CHAP. XXX.

To finde the Parallax of the Moon *from the* Sun *in Longitude and Latitude.*

AT the apparent time of the said Conjunction, the Parallacticall angle is 45d 1′ 46″, and the Parallax of the Moon from the Sun in Altitude 39′ 28″, which known, the Parallax of the Moon from the Sun both in Longitude, and Latitude, according to the second Book 24 Chap. is thus atteined.

I		II	
Radius 90d,	10,00000	Radius 90d,	10,00000
Tangent of 39′ 28″;	8,05998	Sine of 45d 1′ 46″;	9,84971
Co-sine of 45d 1′ 46″,	9,84926	Sine of 39 28″,	8,05995
Tangent of 27′ 54″:	7,90924	Sine of 27 55:	7,90960
Parallax of Longitude 27′ 54″.		Parallax of Latitude 27′ 55″.	

CHAP. XXXI.

To finde the apparent hourly motion of the Moon *from the* Sun.

Rule 1 IF the Eclipse of the Sun happen in the Orientall Quadrant of the Signifer, and the *Parallaxis Longituinis* decrease, substract the *Parallaxis Longitudinis*, in one hour or half hour, from the true hourly or half hourly motion of the ☾ from ☉, but if the *Parallaxis Longitudinis* encrease, adde the said Difference.

Rule 2 If the Sun all the time given, be in the Occidentall Quadrant, and the *Parallaxis Longitudinis* decrease, adde the Difference of the *Parallaxis Longitudinis* to the hourly, or half hourly motion of the Moon from the Sun, otherwise substract the same from the true hourly or half hourly motion, if the *Parallaxis Longitudinis* increase.

Rule 3 If the true Conjunction happen in the 90d of the Ecliptique, so that the former part of the Eclipse happeneth in the Orientall, and the latter part in the Occidentall Quadrant, in which case substract the Difference of the *Parallaxis Longitudinis* from the true hourly motion of the ☾ from the ☉, and the Residue will be the hourly motion of the ☾ from the ☉ seen.

EXAMPLE.

EXAMPLE. In the year 1654, *August* $1^{d}\ 22^{h}\ 0'\ 43''$, the true hourly motion of the Moon from the Sun, is $32'\ 41''$, and the *Parallaxis Longitudinis*, $27'\ 54''$, and because the Conjunction happeneth in the Orientall Quarter of the Ecliptique, I get the *Parallaxis Longitudinis*, to the hour preceeding, which I finde to be $35'\ 9''$, the Difference is $7'\ 15''$, and because the *Parallaxis Longitudinis*, decreaseth, I deduct the said Difference from the true hourly motion $32'\ 41''$, and the Remainder $25'\ 26''$, is the hourly motion of the Moon from the Sun seen to the hour preceeding the true Conjunction.

CHAP. XXIX.

To finde the Intervall, or space between the true and apparent Conjunction of the Luminaries.

TO the time of the true Conjunction, compute the *Parallaxis Longitudinis*, of the Moon from the Sun, and if it be lesse then the hourly motion seen, divide the same by the hourly motion seen, and the Quotient will be the Intervall, or space between the true and apparent Conjunction, to be substracted from the time of the true Conjunction in the Orientall Quadrant, and to be added in the Occidentall. But if the *Parallaxis Longitudinis* be greater then the hourly motion of the Moon from the Sun seen, first take the hourly motion seen out of the *Parallaxis Longitudinis*, and the Residue part by the hourly motion of the Moon from the Sun seen; for the hour wherein it fals, and the Quotus will give the space of time above one hour, between the true and apparent Conjunction, either to be added to the time of the true Conjunction, or to be substracted from the same, according as it happens in the Orientall or Occidentall parts of the Ecliptique, as hath been said before.

EXAMPLE. At the time of the true Conjunction of the Sun and Moon to happen 1654 *August* $1^{d}\ 22^{h}\ 0'\ 43''$, (which fals in the Orientall Quadrant, according to the 26 Chapter:) at which time the *Parallaxis Longitudinis* is $27'\ 54''$, from which I deduct the hourly motion seen $25'\ 26''$, and there remains $2'\ 28''$, therefore I again get the *Parallaxis Longitudinis*, to $15'$ of an hour sooner, and I finde the Difference of the the *Parallaxis Longitudinis* answering to $15'$ to be, $1'\ 34''$, and therefore the motion of the Moon from the Sun seen agreeing to $15'$, is $6'\ 36''$, by which I divide the Remainder of the *Parallaxis Longitudinis*, $2'\ 28''$, and the *Quotus* $5'\ 29''$ is the measure of time above one hour, that the visible Conjunction antecedes the true.

		D	H	′	″
Apparent time of the true Conjunction at *London*,	*August*	1	22	0	43
Intervall of the true and visible Conjunction,	*Substract*		1	5	29
Time of the visible Conjunction at *London*,	*August*	1	20	55	14

If you would know whether this be the exact time of the visible Conjunction, or no, seek the *Parallaxis Longitudinis*, to the time of the visible Conjunction, and also the true distance of the Sun and Moon by the true hourly motion, for if these two shall be equall, you may conclude the visible Conjunction is truly found, but if otherways, the time of the visible Conjunction is to be corrected.

EXAMPLE. At the time of the visible Conjunction to be 1654, *August*, $1^{d}\ 20^{h}\ 55'\ 14''$, I finde the *Parallaxis Longitudinis* to be $35'\ 43''$ towards the East, and the true Distance of the Moon from the Sun to be also $35'\ 43''$ towards the West, and because they are equall, I conclude the visible Conjunction is precisely found.

CHAP. XXXIII.

To find the apparent Latitude of the Moon *at the time of the visible Conjunction.*

HAving found the time of the visible Conjunction, and rectified the place of the Moon to the time of the true Conjunction, then by the true hourly motion, compute the true motion of the Moon for the Intervall or space between the true and apparent Conjunction, which adde to, or substract from, the true motion of the Moon at the time of the true Conjunction, according as the visible, precedes or succeeds the true, and you shall thereby obtein her true place at the time of the visible Conjunction. In like manner are you to reduce the place of her Node Ascending to the visible Conjunction, then deduct the motion of her Node Ascending, from the true motion of the Moon, the Remainder will be the Anomalie of the Moons Latitude at the time of the visible Conjunction, by which (according to the 5 Chap.) you may obtein her Latitude, then, as before is taught; you must also to the same instant, calculate the *Parallaxis Latitudinis,* then consider whether they be both of one affection, that is to say, both North, or both South, if they be, adde her Parallax and Latitude together, but if they be of different affections, namely, the one North, and the other South, then substract the lesser from the greater, for so the Aggregate, or Difference, wil shew the apparent Latitude of the Moon at the time of the visible Conjunction, either Northward, or Southward, which you may always know by the propriety of the greater number, for the Latitude of the Moon seen will be of the same Denomination and Species that the greater number is of, &c.

An illustration by Example.

		S	D	′	″
Place of ☾ at time of the true ☌.		4	19	34	25
Motion of ☾ agreeing to the Intervall of the true and visible ☌.	*Substr.*			38	17
True place of ☾ at time of the visible ☌.		4	18	56	8
Place of her Node Ascend. at time of the visible ☌.	*Substract*	10	25	9	12
True motion of ☾ Latitude from ☊ at time of visible Conjunction.		5	23	46	56
Therefore her true Latitude.	*North Desc.*			32	27
Parallaxis Latitudinis of ☾ from ☉.	*South Substract*			26	47
Rests Latitude of ☾ seen.	*North Descend.*			5	40

CHAP. XXXIV.

To finde how many Digits the Sun *will be Eclipsed.*

FRom the Aggregate of the Semidiameters of the Sun and the Moon, deduct the apparent Latitude of the Moon at the time of the visible Conjunction, the Remainder will be the Parts deficient, which being obteined: the Analogie is. As the Diameter of the Sun 32′ 28″, is to 12 Dig. so is the Parts Deficient 27′ 6″, to 10 Dig. 0′ 59″.

The Operation by the Sexagenary Table.

		′	″	
		27	6	
		12		
	5	24		
		1	12	[10 Dig. 0′ 59″.
Aggregate	5	25	12	Therfore the Digits Eclipsed.
Diameter ☉	32	28		are 10 Dig. 0′ 59″.
	5	20		
		4	40	
	5	24	40	
Rests		0	32	
Diameter ☉		32	28	

CHAP.

CHAP. XXXV.

To finde the Minutes and time of Incidence, Emersion, and Duration of the Suns *Eclipse.*

IN the second Book 29 Chap. you have sufficient Directions to finde the minutes of Incidence, neverthelesse it cannot here be amisse (according to the fundamentall grounds there delivered) to annex the Operation applyed to our present purpose.

In the Eclipse of the Sun before treated of, to be 1654, the Summe of the Semidiameters of the ☉ and ☾ being reduced into seconds, is 1966″, and the Latitude of the Moon seen 5′ 40″, or (being reduced) 340″.

The Operation.

Summe of the Semidiameters of ☉ and ☾		1966″	
Latitude of the ☾ seen		340	
	Summe	2306	3,362859
	Difference	1626	3,211120
	Aggregate		6,573979
Minutes of Incidence 32′ 16″, or 1936″.	Semi-aggreg.		3,286989

Lastly, to finde the time of Incidence and Emersion, we must get the hourly motion seen, (as is before taught) for the hour preceding the visible Conjunction, and also for the hour succeeding it: by the former whereof, divide the minutes of Incidence and the Quotient will be the time of Incidence, and by making Division by the latter, the Quotient will be the time of Emersion.

As in the Eclipse of the Sun, to be 1654, *August* 2d *A. M.* the hourly motion seen, to the hour preceding the visible Conjunction is 27′ 2″, and to the hour succeeding it 24′ 45″, therefore, to finde the time of Incidence and Emersion, I work as followeth.

Minutes of Incidence	32′ 16″	Minutes of Incidence	32′ 16″
Hourly motion seen 1^h before the visible ☌.	27 2 [1^h 11′ 37″	Hourly motion 1^h following.	24 45 [1^h 18′ 13″
Rests	5 14	Rests	7 31
Hourly motion	27 2	Hourly motion	24 45
	4 57		7 12
	0 22		13 30
	4 57 22		7 25 30
Rests	16 38	Rests	5 30
Hourly motion	27 2	Hourly motion	24 45

	H	′	″
Hence the time of Incidence is	1	11	37
The time of Emersion	1	18	13
The totall duration	2	29	50

CHAP. XXXVI.

To finde the Intervall between the visible Conjunction, and the greatest Obscuration.

WIth the Latitude of the Moonseen, enter the Table of the Distance of the true or visible ☌ or ☍ ☉ ☾ from the greatest Obscuration, and the Distance there found, divide by the hourely motion seen, the *Quotus* will give the Intervall of time to be added, or substracted (according to the Titles) to or from the visible Conjunction, so will the Summe, or Difference, shew the time of the greatest Obscuration.

Ex-

EXAMPLE. The Latitude of the Moon seen in our Eclipse 5′ 40″, North-Descending, giveth the Intervall 29″, with the Title *Adde*, which divided (as in manner aforesaid) by the hourly motion seen, for the hour following the visible Conjunction 24′ 45″, pointeth out the Intervall of time between the visible Conjunction and greatest Obscuration 1′ 10″ to be added, whereby the greatest Obscuration is at 8^h 56′ 24″ in the morning, from which substracting the time of Incidence, sheweth the beginning of the Eclipse, and adding thereto the time of emersion, the Aggregate wil shew the time of the ending of the Eclipse.

		D	H	′	″
Time of greatest Obscuration,	*August*	2	8	56	24
Time of Incidence,	*Substract*		1	11	37
Time of the beginning of the Eclipse.			7	44	47
Time of emersion.	*Adde*		1	18	13
Time of the end of the Eclipse			10	14	37

Vide Lib. 2. cap. 3c.

CHAP. XXXVII.

To finde the apparent Latitude of the Moon *at the beginning and ending of the Eclipse.*

ACcording to the Directions before laid down, calculate the true Latitude of the Moon, and the *Parallaxis Latitudinis*, both to the time of the beginning and ending of the Eclipse, which you are to conferre together, making addition, or substraction, as you are directed Chapter 33, and you shall have the *Latitudo apparens*, or Latitude seen, both to the beginning and ending of the Eclipse.

EXAMPLE. At the beginning of the Eclipse, the true Latitude of the Moon is 35′ 58″ North, and the *Parallaxis Latitudinis*, 26′ 49″ South, and because they are of different affections, I take their Difference 9′ 9″, which sheweth that the Latitude of the Moon seen at the beginning of the Eclipse, is 9′ 9″ North. Again, at the end of the Eclipse, the Latitude of the Moon is 28′ 22″ North, and the *Parallaxis Latitudinis* 28′ 12″ South, which deducted from the former, leaveth the Latitude of the Moon seen at the end of the Eclipse 0′ 10″ North.

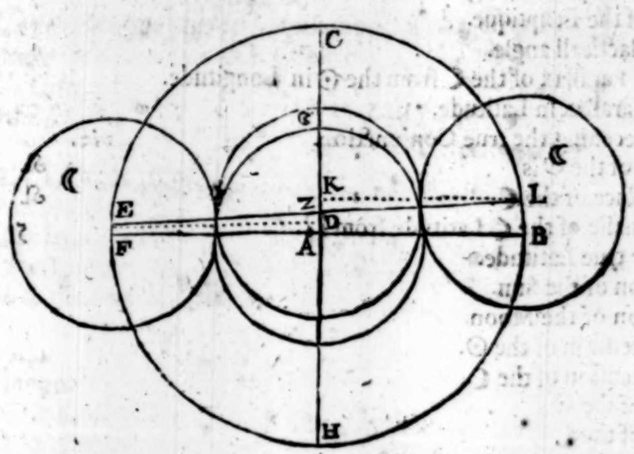
CHAP. XXXVIII.

To describe the Eclipse of the Sun *in plano.*

THe Delineation of the Suns Eclipse differs not much from the Moons, for in the following Figure, on the Point A, (the intersection of the Orthogonall lines) draw a Circle, which may contein the Semidiameters of the Sun and Moon, and then place the apparent Latitude at the beginning and ending of the Eclipse, as you were directed in the Moons Eclipse.

EXAMPLE. In the Eclipse of the Sun to be 1654, *August* 2d, the Semidiameter of the Sun is 16′ 14″, and the Semidiameter of the Moon 16′ 32″, also the apparent Latitude of the Moon at the beginning is 9′ 9″ North, and at the end 0′ 10″, North, therefore (in the Figure following) on the Center A, I describe a Circle representing the Sun, whose Semidiameter A C shall contein 16′ 14″, then from the Center A, upon the line A C, I number the apparent Latitude in the beginning of the Eclipse 9′ 9″ North, drawing forth the line K L, parallel to A B, and likewise from the Center A, upon the line A C, I number the *Latitudo apparens*, at the end of the Eclipse 0′ 10″ North, drawing the line D E, parallel to A F, then extend a line from L to E, which shall signifie the way of the Moon during the time of the Eclipse, upon which line describe three Moons, whereof the first upon the Center L, shews her place at the beginning of the Eclipse, the second upon the Center Z, shews her place at the middle of the Eclipse, and the third upon the Center E, shews her place at the end of the Eclipse, as may appear by the following Scheme.

A Figure thereof.



CHAP XXXIX.

A Synopsis of the Calculation.

		S / D	D / Ho.	′	″
THe middle Conjunction of the Luminaries.	*August*	2	10	2	44
The Intervall of the middle and true Conjunction.	*Subs.*		11	52	37
The middle time of the true Conjunction.	*August*	1	22	10	7
Æquation of Time.				6	55
The apparent time of the true Conjunction.	*August*	1	22	3	12
The Co-æquate Anomalie of the ☉.		1	13	36	52
The Co-æquate Anomalie of the ☾.					
The true place of ☉ (and ☾ in her Orbite.)		♌	19	34	25
Motion of the Moons Node Ascending.		10	25	9	3
Hence the Anomalie of her Latitude from ☊.		5	24	25	22
Therefore her true Latitude.	*North Descending*			29	7
Reduction adde.				1	21
Place of ☾ in the Ecliptique.		♌	19	35	46
☉				2	24
Hourly motion of the ☾.				35	5
☾ from ☉.				32	41
By which dividing the Reduction, the Quotient in time is	*Subst.*			2	29
Exact time of the true Conjunction at *London.*	*August*	1	22	0	43
At which time the ☉ is distant from the Meridian.			29	49	15
And the ☾.			29	58	26
Declination of the ☉.			15	0	3
Declination of the ☾.			15	27	43
Right Ascension of the ☉.			142	0	28
Right Ascension of the ☾.			142	9	39
Altitude of the ☉.			46	23	0
Altitude of the ☾.			46	43	38
Distance of the ☉ from the Earth.			101302		
Distance of the ☾ from the Earth.			3981		
Parallax of the ☉ in the Circle of Altitude.				1	36
Parallax of the ☾ in the Circle of Altitude.				41	4
Parallax of the ☾ from the ☉ in the Circle of Altitude.				39	28
Right Ascension of the *Medium Cœli.*			112	11	13
Adding 90d. giveth the Oblique Ascension of the point rising.			202	11	13

Therefore

		D S	H D	′ ′	″ ″
Therefore the point rising is.			15	37	♎
The 90^{d} of the Ecliptique.			15	37	♋
The Parallacticall angle.			45	1	46
Hence the Parallax of the ☾ from the ☉ in Longitude.				27	54
And the Parallax in Latitude.				27	55
To one preceding the true Conjunction.	*viz.*		21	0	43
The place of the ☉ is		♌	19	32	1
And the place of the ☾.		♌	18	59	20
The Anomalie of the ☾ Latitude from ☊.		5	23	50	9
Hence her true Latitude.				32	10
Declination of the Sun.			15	0	49
Declination of the Moon.			15	41	42
Right Ascension of the ☉.			141	58	5
Right Ascension of the ☾.			141	36	31
Altitude of the ☉.			38	58	39
Altitude of the ☾.			39	44	5
Distance of the ☉ from the Earth.			101	302	
Distance of the ☾ from the Earth.			3979		
Parallax of the ☉ in Altitude.				1	49
Parallax of the ☾ in Altitude.				46	1
Parallax of the ☾ from the ☉ in Altitude.				44	12
Right Ascension of the *Medium Cœli.*			97	8	50
Oblique Ascension of the point rising.			187	8	50
Hence the point rising is			2	5	♎
The 90^{d} of the Ecliptique.			2	5	♋
The Parallacticall angle.			37	20	58
Parallax of ☾ from ☉ in Longitude.				35	9
Parallax of ☾ from ☉ in Latitude.				26	49
Difference of the *Parallaxis Longitudinis* in the hour given.				7	15
Hourly motion of ☾ from ☉ seen.				25	26
Which substracted from the *Parallaxis Longitudinis* at the time of the true Conjunction, leaveth.				2	28
To one hour 15′ preceding the true Conjunction, *viz.*	*Aug.*	1	20	45	43
The place of the ☉ is.		♌	19	31	25
The place of the ☾.		♌	18	50	34
Anomalie of the Moons Latitude from ☊.		5	23	41	21
True Latitude of the ☾.	*North*			32	56
Declination of the ☉.			15	0	59
Declination of the ☾.			15	45	8
Right Ascension of the ☉.			141	57	32
Right Ascension of the ☾.			141	28	9
Altitude of the ☉.			36	54	6
Altitude of the ☾.			37	46	27
Distance of the ☉ from the Earth.			101	302	
Distance of the ☾ from the Earth.			3979		
Parallax of the ☉ in Altitude.				1	52
Parallax of the ☾ in Altitude.				47	15
Parallax of the ☾ from the ☉.				45	23
Right Ascension of the *Medium Cœli.*			93	23	17
Oblique Ascension of the Horoscope.			183	23	17
Therefore the Horoscopie, or point rising is.		♎	2	23	35
The 90^{d}.		♋	2	23	35
The Parallacticall angle.			36	0	43
Parallax of the ☾ from the ☉ in Longitude.				36	43
Parallax of the ☾ from the ☉ in Latitude.				26	41
True motion of the ☾ from the ☉ agreeing to 15′.				8	10

Difference

		S	D	′	″
Difference of the *Parallaxis Longitudinis* agreeing to 15′,	*Substract*			1	34
Motion of the ☾ from ☉ seen, agreeing to 15′.				6	36
By which dividing the Parallax before remaining, it giveth in time				5	29
Therefore the Intervall of the true and visible ☌.	*Substract.*		1	5	29
Hence the visible Conjunction happeneth.	*August*	1	20	55	14
At which time the ☉ is in.		♌	19	31	48
And the ☾.		♌	18	56	8
Anomalie of the ☾ Latitude from ☊.		5	23	46	56
The true Latitude of the ☾.	*North*			32	27
Declination of the Sun.			15	0	53
Declination of the Moon.			15	43	0
Right Ascension of the Sun.			141	57.	53
Right Ascension of the Moon.			141	33	10
Altitude of the Sun.			38	13	36
Altitude of the Moon.			39	1	44
Parallax of the ☉ in altitude.				1	50
Parallax of the ☾ in altitude.				46	29
Parallax of the ☾ from the ☉ in altitude.				44	39
Right Ascension of the *Medium Cæli.*			95	46	23
Oblique Ascension of the Point rising.			185	46	23
The point rising.			4	5	♎
The 90 degree.			4	5	♋
The Parallacticall angle.			36	51	56
Parallax of the ☾ from ☉ in Longitude.				35	43
Parallax of the ☾ from the ☉ in Latitude.				26	47
True distance of the ☉ and ☾.				35	43

Which being exactly aquivalent to the Parallaxis Longitudinis, *sheweth the visible* ☌ ☉☾ *is precisely obteined.*

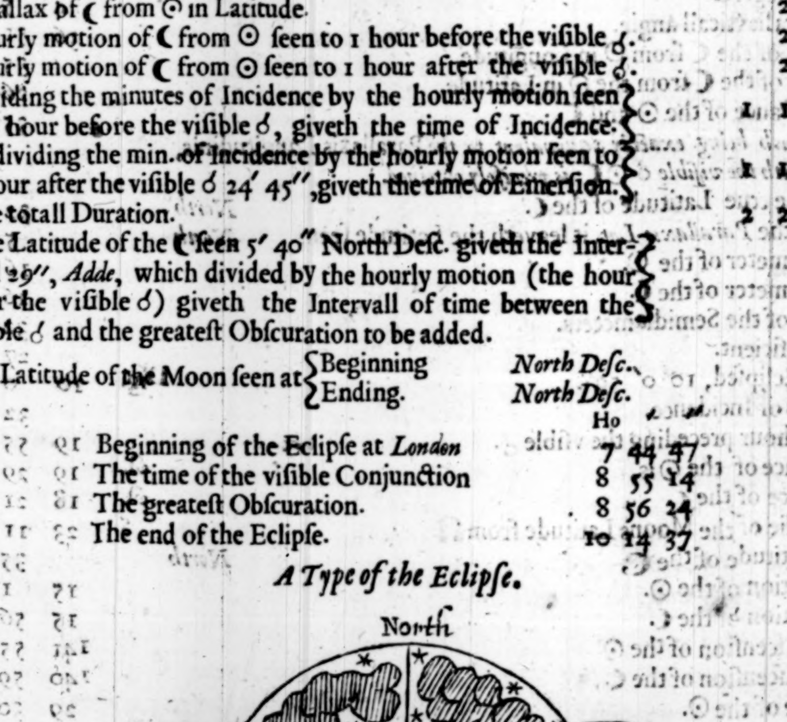
From the true Latitude of the ☾.	*North*			32	27
Taking the *Parallaxis Lat.* it leaveth the Latitude seen,	*North*			5	40
Semidiameter of the ☉.				16	14
Semidiameter of the ☾.				16	32
Summe of the Semidiameters.				32	46
Part Deficient.				27	6
Digits Eclipsed, $10^d\ 0'\ 59''$.	Dig.		10	0	59
Minutes of Incidence.				32	16
To one hour preceding the visible ☌.	*viz.*		19	55	14
The place of the ☉ is,		♌	19	29	4
The place of the ☾.		♌	18	21	0
Anomalie of the Moons Latitude from ☊		5	23	11	40
True Latitude of the ☾,	*North*			35	30
Declination of the ☉.			15	1	44
Declination of the ☾.			15	56	15
Right Ascension of the ☉.			141	55	30
Right Ascension of the ☾.			140	59	0
Altitude of the ☉.			29	30	27
Altitude of the ☾.			30	47	4
Parallax of the ☉ in altitude.				2	1
Parallax of the ☾ in altitude.				51	19
Parallax of the ☾ from the ☉.				49	18
Right Ascension of the *Medium Cæli.*			80	44	0
Oblique Ascension of the point rising.			170	44	0
Therefore the Point rising in Latitude $51^d\ 32'$ is.			23	28	♍
The 90^d.			23	28	♊
The Parallacticall angle.			32	54	10
Parallax of the ☾ from ☉ in Longitude.				41	24

	S	D	′	″
Parallax of the ☾ from ☉ in Latitude.			26	47
To one hour after the visible ☌, *viz.*		21	55	14
The place of the ☉ is	♌	19	34	12
And the place of the ☾.	♌	19	31	13
Anomalie of the Moons Latitude from ☊.	5	24	22	10
The true Latitude of the ☾.			29	24
Declination of the ☉.		15	0	7
Declination of the ☾.		15	29	0
Right Ascension of the ☉.		142	0	15
Right Ascension of the ☾.		142	7	0
Altitude of the ☉.		45	46	54
Altitude of the ☾.		46	9	25
Parallax of the ☉ in Altitude.			1	37
Parallax of the ☾ in Altitude.			41	30
Parallax of the ☾ from the ☉.			39	53
Right Ascension of the *Medium Cœli.*		110	48	45
Oblique Ascension of the point rising.		200	48	45
Therefore the point rising in Latitude $51^d\ 32'$ is.		14	39	♎
The 90^d of the Ecliptique.		14	39	♋
The Parallacticall angle.		44	9	15
Parallax of ☾ from ☉ in Longitude.			28	37
Parallax of ☾ from ☉ in Latitude.			27	47
Hourly motion of ☾ from ☉ seen to 1 hour before the visible ☌.			27	2
Hourly motion of ☾ from ☉ seen to 1 hour after the visible ☌.			24	45
Dividing the minutes of Incidence by the hourly motion seen to 1 hour before the visible ☌, giveth the time of Incidence.		1	11	37
So dividing the min. of Incidence by the hourly motion seen to 1 hour after the visible ☌ 24′ 45″, giveth the time of Emersion.		1	18	13
The totall Duration.		2	29	50
The Latitude of the ☾ seen 5′ 40″ North Desc. giveth the Intervall 29″, *Adde*, which divided by the hourly motion (the hour after the visible ☌) giveth the Intervall of time between the visible ☌ and the greatest Obscuration to be added.			1	10

Latitude of the Moon seen at		′	″
Beginning	*North Desc.*	9	9
Ending.	*North Desc.*	0	10

	Ho	′	″
Beginning of the Eclipse at *London*	7	44	47
The time of the visible Conjunction	8	55	14
The greatest Obscuration.	8	56	24
The end of the Eclipse.	10	14	37

A Type of the Eclipse.



AN APPENDIX:

Conteining such Observations of the Planets Places, as have been made by the Author and others.

§ I. *Observations of the Suns Place.*

ANno 1586, Noble *Tycho* observed the Vernall Æquinoctiall the 10 day of March, at 9 houres 2 min. P. M.

For the difference of Meridians of *London* and *Vraniburg*, must be substracted 50 min. hence the time in the Meridian of *London* is March the 10 day, 8 hou. 12 min.

	⊙ S	D	′	″	Aphel. ⊙ S	D	′	″
The middle motion of the Sun is	11	27	57	50	3	5	28	15
Aphelion of the Sun substracted	3	05	28	15				
Anomalie of the Sun.	8	22	29	35				
Æquation of the Sun added		2	02	10				
Therefore the Sun was in	♈	00	00	00	Agreeing to Observatiõ.			

Anno 1588, March 9d 20h 45′ *Tycho* again observes the Vernall Æquinox at *Vraniburge*.

	⊙ S	D	′	″	Aphel. ⊙ S	D	′	″
The middle motion of the Sun.	11	27	58	01	3	5	30	19
Aphelion of the Sun substracted	3	05	30	19				
Anomalie of the Sun	8	22	27	42				
Æquation of the Sun added		2	02	10				
Therefore the Sun was in	♈	00	00	11	Differing but $\frac{1}{6}$ of a minute from Observation.			

The Illustrious Prince *William Landgrave* of *Hassia*, *Anno* 1572, October the 3d at Noon, he observed the ⊙ in 20d ♂ ♎: See the *Hassiaque* Observation published by *Snellius*: The difference of Meridians is 38′. therefore at *London* the time is, October 2d 23h 22′, at which time the ⊙ place is required.

	⊙ S	D	′	″	Aphel. ⊙ S	D	′	″
Middle motion of the Sun	6	22	01	05	3	05	14	28
Aphelion of Sun substracted	3	05	14	28				
Anomalie of the Sun	3	16	46	37				
Æquation of the Sun subst.		1	58	27				
The Suns true place	6	20	02	38				

Here the difference between the Calculation and Observation is 2′ 38″, which is not a difference perceptable, but I question the Observation, because other Observations seeme to contradict it, besides, I dare be bold to say (with *Eichstade*) that so small a difference, should it be *hallucinous*, could not blemish the certainty of my Tables, for that the most exact and accurate Tables in being, or that may be expected, can seldome or never levell (in the places of the ⊙ ☾ and Stars) neerer then the 15 part of a Degree, as all Astronomers testifie with joynt consent; which I may also affirm of many Observations, wherein errour

V 2 may

may arise, either by fallacy of the Instrument, or want of care, and albeit the Instrument be exact, and never so much Circumspection used, yet a difference will many times be, considering the parvity, and insensible magnitude the Instrument bears to the vast distance of the Object.

§ 2. *An Observation of the Moon and the Star called* Aldebaran, *or* the Buls eye.

ANno 1644, *December* 29^d at 9^h 15′ *P. M.* I observed that the higher part of the Moon did cover, and eclipse the *Buls eye* from my sight, and this Observation was made at *N. Luffenham*, where the Elevation is 52^d ⅔, and the distance of the Meridian from *London* 3′ *ad Occasum*.

The true place of the Sun from the Earth was then 19^d 9′ 30″ ♑, and the middle motions of the Moon as followeth.

☾ s d ′ ″	Aphel. s d ′ ″	Node Asc. ☽ s d ′ ″
2 04 08 52	7 09 19 06	5 00 40 44

2 04 08 52	
7 09 19 06	Aphelion of the Moon substracted.
6 24 49 46	Anomalie of the Moon.
02 02 08	Æquation adde.
6 27 00 54	Anomalie of the Moon æquated.
2 06 20 00	Place of the Moon æquated.
9 19 09 30	True place of the Sun.
4 17 10 30	Distance of the Moon from the Sun.
27 42	Proportionall minutes.
01 17 10	The Variation and Reflection substract.
2 05 02 50	Therefore the Moons true place in her Orbite.
5 00 40 44	Node Ascending ☾ substract.
9 04 22 06	True motion of the Moons Latitude.
01 03	Reduction Adde.
♊ 05 03 53	True place of the Moon in the Ecliptique.
04 59 07	Simple Latitude of the Moon.
16 57	Excesse.
08 50	The Proportionall part Adde.
05 07 57	Therefore the true Latitude of the ☾ South.

According to the Doctrine of the second Book 24 *Chap.* the Parallax of the Moon in Longitude was 9′ 10″, in Latitude 35′ 35″, and because the Moon was in the Occidentall Quadrant of the Signifer, her Parallax of Longitude must be deducted from her true place, therefore the Visible place of the Moons Center was 4^d 54′ 43″ ♊, and her Apparent Latitude 5^d 43′ 32″ towards the South. At the same time the true place of *Aldebaran*, was 4^d 58′ 49″ ♊, and the Latitude 5^d 31′ South, hence the Difference of Longitude is 5′ 54″, and the Difference of Latitude 12′ 32″: so that the Star *Aldebaran*, was distant from the Center of the Moon towards the North-West 13′ 58″, but the Semidiameter of the Moon was 16′ 54″, and therefore covered *Aldebaran*, exactly as I observed at *North-Luffenham*.

§ 3. *Observations of* Saturn.

ANno 1583, *September* 3^d at 1^h *P. M.* in the Meridian of *Uraniburge*, noble *Tycho* observed ♄ exactly in Oppposition of the Sun, in 19^d 50′ ♓.

For the Difference of Meridians is to be substracted 50′, therefore the time in the Horizon of *London*, was 3^d 0^h 10′, at which time we shall first enquire the place of the Sun.

The

	s	d	′	″
The middle motion of the Sun.	5	21	49	29
Aphelion of Sun substracted.	3	05	25	41
Anomalie of the Sun.	2	16	23	48
Æquation of the Sun substract.		01	58	38
Therefore the Suns place was.	5	19	50	51
And the Distance of ⊙ from the Earth	100452 parts			

Aphel. ⊙.
s d ′ ″
3 05 25 41

	s	d	′	″
Middle motion of ♄.	11	26	25	13
Aphelion of ♄ substract.	08	25	36	49
Anomalie of ♄ Excent.	03	00	48	24
Æquation substract.	00	06	34	49
Place of ♄ from ⊙ in his Orbe.	11	19	50	24
Node Ascend. substract.	03	20	22	03
Rests.	07	29	28	21
Reduction substract.	00	00	01	28
Place of ♄ from ⊙ in Eclipt.	11	19	48	56
Place of ⊙.	05	19	50	51
Anomalie of Commutation.	06	00	01	55
Complement to the Circle.	05	29	58	05
Half summe.	00	89	59	02
Parallax of the Orbe substract.	00	00	00	13
True motion of ♄ from the Earth.	11	19	48	43
That is in	♌	19	48	43

Place of Sun 19ᵈ 50′ 51″ ♍.
Distance of ⊙ from Earth 100452.

Argument of Latitude, therefore the Inclination is 2ᵈ 9′ 37″, the Reduction 1′ 28″, and the Curtation 677 parts.

955656	♄ from ⊙ *in Orbità*	
677	Curt. Sub.	
954979	Distance Curtated.	
100452	Dist. of Earth from ⊙	
Summe 10554	31	4,023430
Differ. 8545	27	3,931725
Tangent of 89ᵈ 59′ 2″,		13,552110
		17,483835
Tangent of 89 58 49		13,460405
0 0 13. Par. of the orb		

Anno 1639, *November* 4ᵈ at 8ʰ 0′ *P. M. Bullialdus* observed ♄ in 12ᵈ 38′ ♒: for the difference of Meridians is to be added 10′, so that the time of Observation in respect of the Meridian of *London*, was 8ʰ 10′, at which time.

	s	d	′	″
The middle Motion of the ⊙ is	7	23	40	57
Aphelion of the ⊙ substract.	3	06	23	12
Anomalie of the Sun.	4	17	17	45
Æquation substract.		01	24	48
Therefore the true place of Sun.	7	22	16	09
And his Distance from the Earth.	98711			

	s	d	′	″
Middle motion of ♄.	10	23	39	07
Aphelion of ♄ substract.	08	26	51	58
Anomalie of ♄.	01	26	47	09
Æquation substract.	00	05	17	47
Place of ♄ from ⊙ in his Orbite.	10	18	21	20
Node Ascend. substract.	03	20	55	55
Rests.	06	27	25	25
Reduction substract.	00	00	01	22
Place of ♄ from ⊙ in the Eclipt.	10	18	19	58
Place of ⊙ from the Earth.	07	22	16	09
Anomalie of Commutation.	09	03	56	11
Complement to the Circle.	02	26	03	49
Half summe.	00	43	01	54
Parallax of the Orbe substract.	00	05	40	09
True motion of ♄ fro the Earth.	10	12	39	49
Therefore ♄ in.	♒	12	39	49

Distance of ♄ from ⊙ in his Orbite 985466.

Argument of Latitude, which gives the Inclination 1ᵈ 9′ 17″, the Reduction 1′ 22″, and the Curtation 196.

985270	Distance of ♄ Curtated.	
98711	Distance of Earth from ⊙.	
Summe 10839	81	4,035023
Differ. 8865	59	3,947706
Tangent of 43ᵈ 1′ 54″		9,970137
		13,917843
Tangent of 37 21 45		9,882820
Difference 5 40 9 Par. of Orbe.		

§ 4. *Observations of* Jupiter.

ANno 1591, Aprill the 23^d 19^h 0′ in the Meridian of *Uraniburge*, *Tycho Brahe* observed ♃ then in opposition of the ☉ in 13^d 10′ ♏.

Deducting 50′ for the difference of Meridians, giveth the time at *London* 23^d 18^h 10′, at which time we are to compute the places of ☉ and ♃ as in the following Synopsis.

In ☉	S	D	′	″
Middle motion of the Sun	1	11	31	58
Aphelion of the Sun substracted	3	05	33	29
Anomalie of ☉	10	05	58	29
Æquation added		1	37	56
True place of the ☉	1	13	09	54
And his Distance from the Earth	101076			

In Jupiter.

	S	D	′	″
Middle motion of ♃	7	16	30	14
Aphelion of ♃ substracted	6	07	44	35
Anomalie of the Excent. of ♃	1	08	45	39
Æquation substract.		3	18	50
Place of ♃ from ☉ in his Orb.	7	13	11	24
Node Ascend. substract.	3	05	23	53
Argument of Latitude	4	07	47	31
Reduction Adde.				28
Place of ♃ from ☉ in Eclipt.	7	13	11	52
Place of ☉	1	13	09	54
Anomalie of Commutation.	5	29	58	02
Halfe Summe		89	59	01
Parallax of the Orbe adde.				27
True motion of ♃ from Earth	7	13	12	19
Therefore ♃ is in	♏	13	12	19

Distance therefore of ♃ from ☉ in his Orbe 542446.

Therefore the inclination of ♃ is 1^d 4′ 40″, the Reduction 28″, and the curtation 92 parts.

542354 Dist. ♃ from ☉ Curtated
101076 Distance of Earth fro ☉

Summe 643430		3,808503
Differ. 441278		3,644711
Tangent of 89^d 59′ 1″		13,544191
		17,188902
Tangent of 89^d 58′ 34″		13,380399
		27 Parall. of Orbe

Anno 1595, September the 12^d 6^h 10′, (or 5^h 20′ in the Meridian of *London*) *Tycho* observed ♃ in 28^d 56′ ♓, in Opposition of the ☉.

	S	D	′	″
Middle motion of the Sun	6	00	59	50
Aphelion of the Sun substracted	3	05	38	02
Anomalie of the Sun	2	25	21	48
Æquation substracted		2	02	11
True place of the Sun	5	28	57	39
His distance from the Earth.	100171			

Middle

	S D ′ ″	
Middle motion of ♃.	11 29 42 58	
Aphelion of ♃ substract.	6 07 49 03	
Anomalie of ♃.	5 21 53 55	♃ from ☉ in his Orbite 497366.
Æquation substract.	49 12	
Place of ♃ from ☉ in his Orbite.	11 28 53 46	
Node Ascend. substract.	3 05 24 51	The Inclination is 1^d 21′ 17″, the
Argument of Latitude.	8 23 28 55	Reduction 8″, and the Curtatiõ 146.
Reduction substract.	08	497366 ♃ from ☉ in his Orbite.
		146 Curtation substract.
Place of ♃ from ☉ in the Eclipt.	11 28 53 38	497220 Distance curtated.
Place of the ☉.	5 28 57 39	100171 Distance of Earth frõ ☉.
Anomalie of Commutation.	6 00 04 01	Summe 597391 3,776256
Complement.	5 29 55 59	Difference 397049 3,598844
Half summe.	89 58 00	Tangent of 89^d 58′ 0″, 13,235244
Parallax of the Orbe substract.	1 00	16,834088
True mot. of ♃ from the Earth.	11 28 52 38	Tangent of 89 57 0 13,057832
That is in	♓ 28 52 38	1 0 Paral. of Orbe.

§ 5 *Observations of Mars.*

ANno 1591, *June* 8^d 7^h 43′ the star of ♂ was observed in Opposition of the ☉ in 26^d 43′ ♊.

For the Difference of the Meridians of *London* and *Uraniburge*, we are to abate 50′, & therefore the time of this Observation, was (in the Merid. of *London*) at 6^h 53′.

The Operation.

	S D ′ ″
Middle motion of the ☉.	2 26 24 33
Aphelion of ☉ substract.	3 5 33 37
Anomalie of the ☉.	11 20 50 56
Æquation of ☉ adde.	19 11
Distance of ☉ from the Earth	101780
True place of the ☉.	2 26 43 44

	S D ′ ″	
Middle motion of ♂.	9 05 48 03	
Aphelion of ♂ substract.	4 28 48 24	
Anomalie of the Excentr.	4 06 59 39	Distance of ♂ from ☉ in his Orbe 144674.
Æquation substract.	09 03 35	
Place of ♂ from ☉ in his Orbite.	8 26 44 28	
Node Ascend. substract.	1 16 36 31	
Argument of Latitude.	7 10 07 57	The Reduction of ♂ 52″, the Curtation 33.
Reduction substract.	00 52	
Place of ♂ from ☉ in the Eclipt	8 26 43 36	
Place of the Sun.	2 26 43 44	
Anomalie of Commutation.	6 00 00 08	
Complement.	5 29 59 52	
Half summe.	89 59 56	
Parallax of the Orbe substract.	30	
True mot. of ♂ from the Earth.	8 26 43 06	
That is	♐ 26 43	

Agreeing to Observation.

Anno 1644, *November* 27^{d} at 7 in the morning, I observed ♂ almost ful North, from a star of the third magnitude, call'd *The Heel of the higher Foot of* ♊, he was observed by Instrument to be $3^{d}\,\frac{6}{10}$ from the star towards the North, and about three times his Diameter from the Pole-line towards the West, and because the Right Ascensions of ♂, and the star do both agree with the Zodiacall Arch, I concluded, that ♂ wanted just so much of the said star, in respect of Longitude. The Diameter of ♂ was about 3′.

The Operation.

	S	D	′	″
Middle motion of ☉.	8	16	35	16
Aphelion of ☉ substract.	3	6	28	33
Anomalie of the ☉.	5	10	6	43
Æquation of ☉ substract.			42	39
Distance of ☉ from the Earth.	98336			
True place of the Sun.	8	15	52	37

	S D ′ ″
Middle motion of ♂.	2 11 09 22
Aphelion of ♂ substract.	4 29 53 19
Anomalie of ♂.	9 11 16 03
Æquation of ♂, Adde.	10 05 58
Place of ♂ from ☉ in his Orbite.	2 21 15 20
Node Ascend. substract.	1 17 15 22
Argument of Latitude.	1 03 59 58
Reduction substract.	49
Place of ♂ from ☉ in the Eclipt.	2 21 14 31
True place of the Sun.	8 15 52 37
Anomalie of Commutation.	5 24 38 06
The half summe.	87 19 03
Parallax of the Orbe, Adde.	8 57 24
True mot. of ♂ from the Earth.	3 00 11 55
That is.	♋ 00 12

Distance of ♂ from ☉ in his Orbe 156267

Hence the Inclination of ♂ is $1^{d}\,2'\,4''$ the Reduction 49″, and the Curtatiō 25 parts.

156267 ♂ from ☉ in his Orbite.
25 Curtation substract.

156242 Distance of ♂ from ☉ Cur.
98336 Distance of Earth from ☉.

Summe 254578,	3,405820
Differ. 57906;	2,762723
Tangent of $87^{d}\,19'\,3''$,	11,329265
	14,091988
Tangent of 78 21 39	10,686168
Aggr. 165 40 42, Ang. of Elō.	
Diff. 8 57 24, Paral. of Orb.	

Sine of the angle of Elongation $165^{d}\,40'\,42''$,	9,393339
Sine of the angle of Commutation $5^{d}\,21'\,54''$;	8,970810
Co-tangent of the Inclination $1^{d}\,2'\,4''$,	11,743367
	20,714177
Co-tangent of the Latitude of ♂ $2^{d}\,44'\,6''$:	11,320838

The true place of the star was $0^{d}\,21'$ ♋, with Latitude 53′ South, the place of ♂, by the former Synopsis being then 0 12 ♋, with Latitude $2^{d}\,44'\,6''$ North, therefore the Distance of ♂ from the star in respect of Longitude was 9′ (which is about three times the Diameter of ♂) and in Latitude $3^{d}\,37'$ towards the North, according as I made Observation at *North-Luffenham.*

§ 6 *An*

ANno 1644, *July* 28[d], at 2h *A. M.* I observed ♃ and ♂ very neer together in the East, ♃ being elevated above ♂, in respect of Latitude 8′, and was distant from ♂ about 4′ *ad Ortum.* How my Tables agree hereto, I shall here examine.

⊙	S D ′ ″
Middle motion of ⊙.	4 16 8 0
Aphelion of ⊙ substract.	3 6 28 12
Anomalie of the ⊙.	1 9 39 48
Æquation of ⊙ substract.	1 16 58
Distance of ⊙ from the Earth.	101398
True place of the Sun.	4 14 51 2

♃	S D ′ ″
Middle motion of ♃.	1 13 41 28
Aphelion of ♃ substract.	6 08 37 59
Anomalie of the Excent.	7 05 03 29
Æquation Adde.	03 19 30
Place of ♃ from ⊙ in his Orbite.	1 17 00 58
Node Ascend. substract.	3 05 35 26
Rests.	10 11 25 32
Reduction adde.	29
Place of ♃ from ⊙ in the Eclipt.	1 17 01 27
Place of ⊙ from the Earth.	4 14 51 02
Anomalie of Commutation.	2 27 49 35
The half summe.	43 54 47
Parallax of the Orbe, Adde	11 19 38
True mot. of ♃ from the Earth.	1 28 21 05
That is.	♉ 28 21 05

Gives the Distance of ♃ from ⊙ in his Orbe 502064.

Argument of Latitude, w[ch] gives the Inclination of ♃ 1′ 21″, the Reduction 29″, and the Curtation 83 parts.

502064 ♃ from ⊙ in his Orbite.
83 Curtation substract.

501981 Distance of ♃ curtated.
101398 Distance of Earth from ⊙.

Summe	603379	3,780589
Difference	400983	3,602692
Tangent of 43[d] 54′ 47″,		9,983520
		13,586212
Tangent of 32 35 9		9,805623
Aggr.	76 29 56	Ang. of Elong.
Diff.	11 19 38	Paral. of Orb.

Sine of the angle of Elongation	76[d] 29′ 56″,	9,987829
Sine of the angle of Commutat.	87 49 35;	9,999687
Co-tangent of the Inclination	1 1 21	11,748413
		21,748100
Co-tangent of the Latitude	11 59′ 42″:	11,760271

♂	S D ′ ″
Middle motion of ♂.	0 07 06 37
Aphelion of ♂ substract.	4 29 52 56
Anomalie of the Excentr.	7 07 13 41
Æquation Adde.	06 59 14
Place of ♂ from ⊙ in his Orbite.	0 14 5 51
Node Ascend. substract.	1 17 15 07
Argument of Latitude.	10 26 50 44
Reduction adde.	44
Place of ♂ from ⊙ in the Eclipt.	0 14 06 35
Place of the Sun from the Earth.	4 14 51 02
Anomalie of Commutation.	4 00 44 27
Half summe.	60 22 13
Parallax of the Orbe Adde.	1 14 08 43
True mot. of ♂ from the Earth.	1 28 15 18
Videlicet	♉ 28 15 18

Distance of ♂ from ⊙ in his Orbite 141643.

The Inclination of ♂ is 1[d] 0′ 42″. Reduction 44″, and the Curtation 23 parts.

141643 ♂ from ⊙ in his Orbite.
23 Curtation substract.

141620 The Distance Curtated.
101398 Distance of Earth from ⊙.

Summe	243018,	3,385638
Differ.	40222;	2,604464
Tangent of 60[d] 22′ 13″,		10,245068
		12,849532
Tangent of 16 13 30		9,463894
Aggr.	76 35 42,	Ang. of Elóg.
Diff.	44 8 43,	Paral. of Orb.

Sine of the angle of Elongation	76[d] 35′ 43″,	9,988004
Sine of the angle of Commutation	59[d] 15′ 33″;	9,934240
Co-tangent of the Inclination	1[d] 0′ 42″,	11,753039
		21,687279
Co-tangent of the Latitude of ♂	1[d] 8′ 42″:	11,699275

The

The Difference of Longitude was 5′ 47″, and the Difference of Latitude 9′, hence the Difference of the Calculation from the Observation is little above one minute, which æqualizeth the Parallax of ♂ from ♃, and therefore agrees exactly with the Observation I made at *North-Luffenham*.

§ 7. *Observations of* Venus.

ANno 1649 *Aprill* 11^d 11^h *P. M.* I heedfully observed the true place of ♀, by her Application to the fixed stars, and by help of a large Instrument curiously divided, I found her true place according to Longitude 17^d 30′ ♊, and her Latitude $3\frac{1}{3}$ towards the North, and in this Observation, I considered her Parallax and Refraction &c.

	S	D	′	″	
Middle motion of the ☉.	1	0	20	14	
Aphelion of ☉ substract.	3	6	33	3	
Anomalie of the ☉.	9	23	47	11	
Æquation adde.		1	51	13	
Distance of ☉ from the Earth	100748				
True place of the ☉.	1	2	11	27	*viz.* 2^d 11′ 27″ ♉.

	S	D	′	″
Middle motion of ♀.	5	12	42	49
Aphelion substract.	10	05	06	37
Anomalie of the Excent.	7	07	36	12
Æquation Adde.			29	14
Place of ♀ from ☉ in her Orbite.	5	13	12	3
Node Ascend. substract.	2	13	28	22
Rests.	2	29	43	41
Reduction substract.				2
Place of ♀ from ☉ in the Eclipt.	5	13	12	01
True Place of the ☉.	1	2	11	27
Anomalie of Commutation.	4	11	00	34
Half summe		65	30	17
Parall. of Orbe adde to ☉ place.	1	15	16	42
Place of ♀ from the Earth.	2	17	28	9

Distance of ♀ from ☉ in her Orbite 71910.

The Argument of Latitude, with which I finde the Inclination 3^d 22′ 50″, the Reduct. 2″, & the Curt. 126.

71910 Dist. of ♀ fró ☉ in her Orb.
126 Curtation substract.

71784 Distance of ♀ from ☉ Curt.
100748 Distance of Earth from ☉.

Summe 1725|32,	4,236870
Differ. 2896|4;	3,461858
Tang. of 65^d 30′ 17″,	10,341390
	13,803248
Tang of 20 13 35,	9,566378
Diff. 45 16 42. Parallax of Orb.	

Sine of the angle of Elongation	45^d 16′ 42″,	9,851584
Sine of the angle of Commutation	48 59 26;	9,877717
Co-tangent of Inclination	3 22 50,	11,228620
		21,106347
Co-tangent of the Latitude of ♀. 3^d 11′ 11″:		11,254763

Agreeing neer to Observation.

Anno 1574, *September* 16^d at 4^h *A. M. Michael Mæstlin* saw ♀ cover the *Lyons Heart*. *Mæstlin Epit. Astron. pag.* 519. *& Kepler in Astron. Opticâ pag.* 305.

For the Difference of Meridians I deduct 36′, from the time given, and the Residue 3^h 24′ is the time of the observation in the Meridian of *London*, to which time I have form'd the following Paradigma.

	S	D	′	″	
Middle motion of the ☉.	6	4	27	26	
Aphelion of the ☉ substract.	3	5	16	28	
Anomalie of the ☉.	2	29	10	58	
Æquation of ☉ substract.		2	2	49	
Distance of the Earth from ☉.		100056			
Place of ☉ from the Earth.	6	2	24	37	viz. ♎ 2^d 24′ 37″.

	S	D	′	″	
Middle motion of ♀.	2	24	37	47	
Aphelion substract.	10	03	59	30	Distance of ♀ from ☉ in her Orbite
Anomalie of the Excent.	4	20	38	17	71920.
Æquation substract.			30	24	
Place of ♀ from ☉ in her Orbite.	2	24	07	23	Argument of Latitude, therefore the Inclination is 0^d 46′ 3″, the Re-
Node Ascend substract.	2	12	43	37	duction 1′ 10″, & the Curt. 5 parts.
					100056, Distance of Earth frõ ☉.
Rests	0	11	23	46	71915 Distance of ♀ Curtated.
Reduction substract.			01	10	
					Summe 171971 — 4,235455
Place of ♀ from ☉ in the Eclipt.	2	24	06	13	
Place of ☉ from the Earth.	6	02	24	37	Differ. 28141 — 3,449339
					Tang. of 49^d 9′ 12″, — 10,063184
Anomalie of Commutation.	8	21	41	36	
The Complement to 12 Signes.	3	08	18	24	13,512523
The half summe,		49	09	12	Tang. of 10 43 2 — 9,277068
Parallax of the Orb substract.	1	08	26	10	38 26 10 Paralla. of Orb.
Place of ♀ from the Earth.	4	23	58	27	
That is.	♌	23	58	27	

Sine of the angle of Elongation 38^d 26′ 10″,	9,793540
Sine of the angle of Commutation 81^d 41′ 36″,	9,995419
Co-tangent of the Inclination 0^d 40′ 3″.	11,933654
	21,929073
Co-tangent of the Latitude 25^d 10′	12,135533

The true place of *Cor Leonis*, was at the time of this Observation in 23^d 54′ 46″ ♌, and the Latitude thereof 26′ and a half North, therefore the Difference of Longitude was 3′ 41″, and the Difference of Latitude 1′ 20″, and in regard the Parallax of ♀ was litile or nothing, it appears (by Calculation) that ♀ then touched the *Lyons Heart*, and did Eclipse it exactly about half an hour before 4^h in the morning.

§ 8. *An Observation of* Venus *and* Mercury.

ANno 1644, *February* 14^d at 6^h *P. M.* I observed ♀ and ☿ neer together in the West, at which time I took their Distance, finding it to be 3^d and a half, ☿ bearing from ♀ towards the North-West. And this Observation I made at *North-Luffenham* with great heed and circumspection, being at that time very desirous to try the verity of *Keplers* Tables.

The Operation.

	S	D	′	″	
Middle motion of the ☉.	11	4	9	32	
Aphelion of the ☉.	3	6	27	45	
Anomalie of the ☉.	7	27	41	47	
Æquation Adde.		1	45	13	
Distance of the Earth from ☉.		99072			
True place of ☉ from the Earth.	11	5	54	45	viz. 5d 54′ 45″ ♓

	S D ′ ″
Middle motion of ♀.	0 25 29 21
Aphelion substract.	10 05 01 58
Anomalie of ♀.	2 20 27 23
Æquation substract.	46 45
Place of ♀ from ☉ in her Orbite.	0 24 42 36
Node Ascend. substract.	2 13 25 16
Rests.	10 11 17 20
Reduction adde.	2 57
Place of ♀ from ☉ in the Eclipt.	0 24 45 33
Place of the Sun from the Earth.	11 05 54 45
Anomalie of Commutation.	1 18 50 48
Half summe.	24 25 24
Parallax of the Orbe Adde.	20 22 06
True mot. of ♀ from the Earth.	11 26 16 51

Distance of ♀ from ☉ in her Orbite 72389.

Argument of Latitude, which giveth the Inclination of ♀ 2d 32′ 22″ South, the Reduction 2′ 57″, and the Curtation 72 Parts.

99072	Earth from ☉.	
72317	♀ from the ☉ Curt	
Summe 171389		4,239983
Differ. 26755		3,427404
Tang. of 24d 25′ 24″,		9,657162
		13,084566
Tang. of 4 3 18		8,850583
Diff. 20 22 6	Parallax of Orbe.	

Sine of the angle of Elongation	20d 22′ 6″,	9,541646
Sine of the angle of Commutat.	48 50 48;	9,876766
Co-tangent of the Inclination.	2 32 22	11,353100
		21,229866
Co-tangent of the Latitude ♀	1d 16′ 28″:	11,688220

	S D ′ ″
Middle motion of ☿.	2 18 56 25
Aphelion substract.	8 14 03 18
Anomalie of ☿.	6 04 53 07
Æquation Adde.	02 33 29
Place of ☿ from ☉ in his Orbite.	2 21 29 54
Node Ascend. substract.	1 13 34 42
Argument of Latitude.	1 07 55 12
Reduction substract.	12 07
Place of ☿ from ☉ in the Eclipt.	2 21 17 47
Place of ☉ from the Earth.	11 05 54 45
Anomalie of Commutation.	3 15 23 02
Half summe.	52 41 31
Parall. of Orbe adde.	17 52 56
Place of ☿ from the Earth.	11 23 47 41

Distance of ☿ from ☉ in his Orbe 30555.

The Inclination 4d 14′ 25″ North, the Reduction 12′ 7″, & the Curtat. 105. therefore the Distance Curtat. is 30450

99072	Earth from ☉.	
30450	☿ from ☉.	
Summe 129522,		4,112343
Differ. 68622;		3,836463
Tang. of 52d 41′ 31″,		10,118034
		13,954497
Tang. of 34 48 35,		9,842154
Diff. 17 52 56.	Parallax of Orbe.	

Sine of the angle of Elongation	57d 52′ 36″,	9,487225
Sine of the angle of Commutat.	74 36 58;	9,984153
Co-tangent of the Incliuation	4 14 25,	11,129934
		21,114087
Co-tangent of the Latitude of ☿	1 21 9	11,626862

The

The Difference of Longitude is $2^d\ 29'\ 10''$, and the Difference of Latitude $2^d\ 31'\ 37''$, and therefore ☿ was distant from ♀ $3^d\ 32'$ towards the North West, agreeing to Observation.

Anno 1598 *September* $14^d\ 15^h$ *P. M. John Kepler* observed (at *Grats* in *Stiria*) that the *Lyons Heart* was covered by the morning star *Venus. Kepler Astron. Opt. pag.* 305.

For the Difference of Meridians, I deduct from the time given $1^h\ 2'$ and the Residue $13^h\ 58'$ was the time at *London*.

The Operation.

☉.	S	D	′	″	
Middle motion of ☉.	6	3	35	32	
Aphelion of ☉ substract.	3	5	41	7	
Anomalie of the ☉.	2	27	54	25	
Æquation substract.		2	2	39	
Distance of ☉ from the Earth.	100095				
True place of the Sun.	6	1	32	53	viz. $1^d\ 32'\ 53''$ ♎

	S	D	′	″
Middle motion of ♀.	2	27	34	41
Aphelion substract.	10	4	21	6
Anomalie of ♀	4	23	13	35
Æquation Substract.			28	41
Place of ♀ from ☉ in her Orbite.	2	27	6	00
Node Ascend. substract.	2	12	58	00
Rests.	0	14	8	00
Reduction substract.			1	25
Place of ♀ from ☉ in the Eclipt.	2	27	4	35
Place of ☉ from the Earth.	6	1	32	53
Anomalie of Commutation.	8	25	31	42
Complement to the Circle.	3	4	28	18
The half.		47	14	9
Parallax of the Orbe, substract	1	7	11	2
True place of ♀ from the Earth.	4	24	21	51

Distance of ♀ from ☉ in her Orbe 71906.

Argument of Latitude: hence the Inclination of ♀ is $0^d\ 49'\ 31''$ the Reduction $1'\ 25''$ and the Curtation 8 parts.

100095. Earth from the ☉.
71898. ♀ from the ☉ Curt.

Summe	171993	4,235511
Difference	28197	3,450203
Tangent of	$47^d\ 14'\ 9''$,	10,033929
		13,484132
Tangent of	10 3 7	9,248621
Dif.	37 11 2 Parallax of the Orbe.	

Sine of the Angle of Elong.	$37^d\ 11'\ 2''$	9,781306
Sine of the Angle of Commutat.	85 31 42	9,998676
Co-tangent of the Inclination	co 49 31	11,841493
		21,840169
Co-tangent of the Latitude ♀	$30'\ 1''$	12,058863

The true Longitude of the Lions Heart at the time of this Animadversion was ♌ $24^d, 15'\ 2''$, with Latitude $26\frac{1}{2}'$ North, therefore their Difference of Longitude was $5\frac{3}{4}'$, and their difference of Latitude $3\frac{1}{2}'$. But because it was observed in, or neer the Horizon, the said stars appeared of a greater magnitude then commonly they seem to be of elswhere, and therefore to the eye, ♀ might seem to hide *Cor Leonis*: Besides, if the Observation were taken at their rising, as is affirmed, the Distance of their Centers was not then above $3'$, which the Diameter of ♀ exceeded, and therefore must needs cover the star, as *Kepler* observed.

In